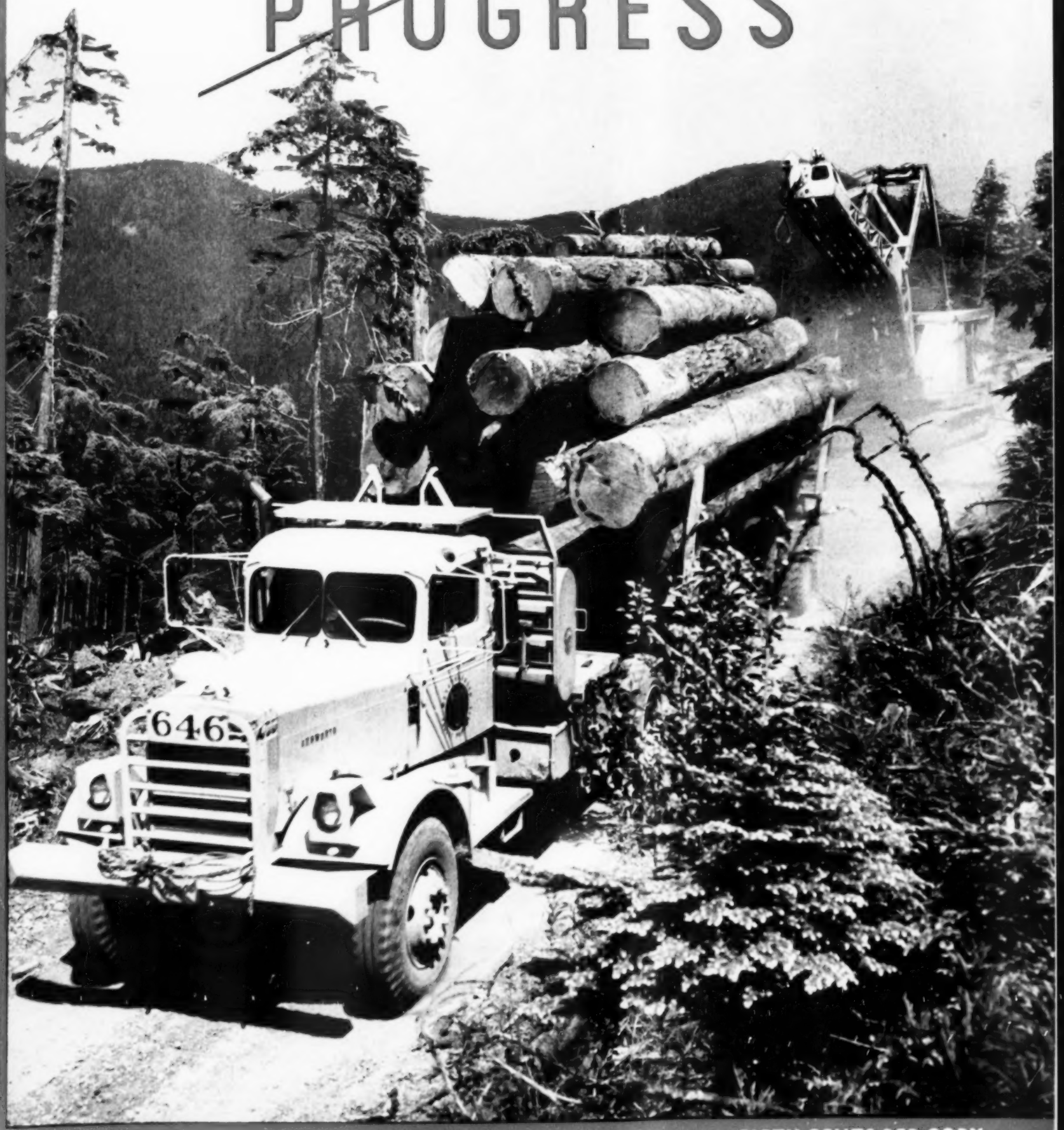
IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR

DIESEL PROGRESS



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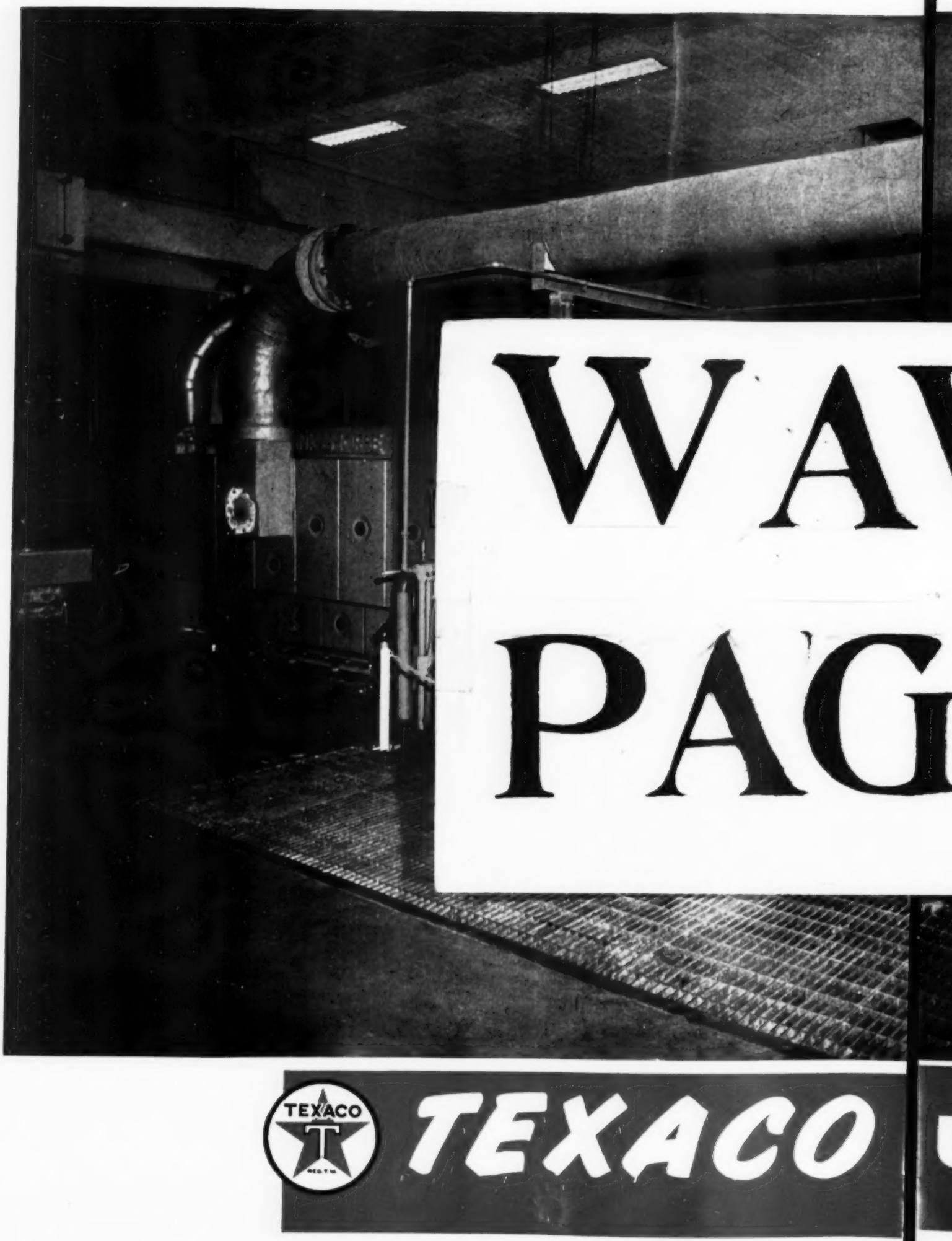
WA
PAG
TEXACO
TEXACO

AVY

GES

IS pumping station (name on request) driven by three Fairbanks-Morse dual-fuel bricated with one of the famous *Texaco Ursa* Operation has been *"exceptionally clean—no rankcase, no carbon formations, and rings grooves. Wear is negligible . . . low mainte- and low fuel consumption."*

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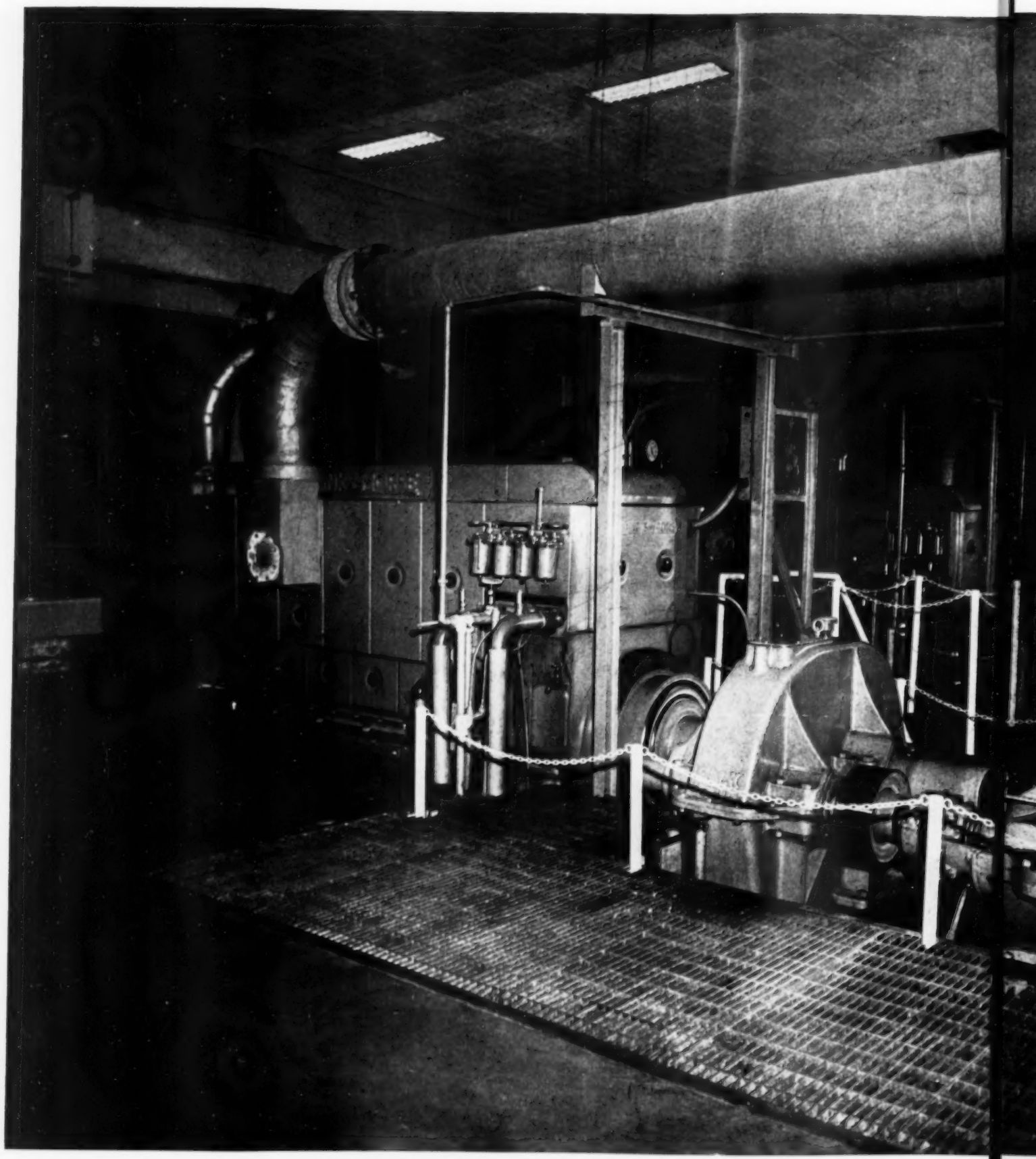
ous *Texaco Ursa Oil* series is a complete lin ng oils especially refined to make diesel, gas el engines deliver *more power* with *less fuel* over *longer periods* between overhauls.

Let a Texaco Lubrication Engineer show you how effective lubrication—*Texaco*—can benefit your plant. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

URSA OILS FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES



TEXACO

Pumping station dual-fuel engines kept "EXCEPTIONALLY CLEAN..."

IN THIS pumping station (name on request) pumps are driven by three Fairbanks-Morse dual-fuel engines, lubricated with one of the famous *Texaco Ursa Oil* series. Operation has been *"exceptionally clean—no sludge in crankcase, no carbon formations, and rings free in their grooves. Wear is negligible . . . low maintenance costs and low fuel consumption."*

Benefits like these account for the fact that—

> *For over 20 years, more stationary diesel h.p. in the U.S. has been lubricated with Texaco than with any other brand.*

The famous *Texaco Ursa Oil* series is a complete line of lubricating oils especially refined to make diesel, gas and dual-fuel engines deliver *more power* with *less fuel* over *longer periods* between overhauls.

Let a Texaco Lubrication Engineer show you how effective lubrication—*Texaco*—can benefit your plant. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

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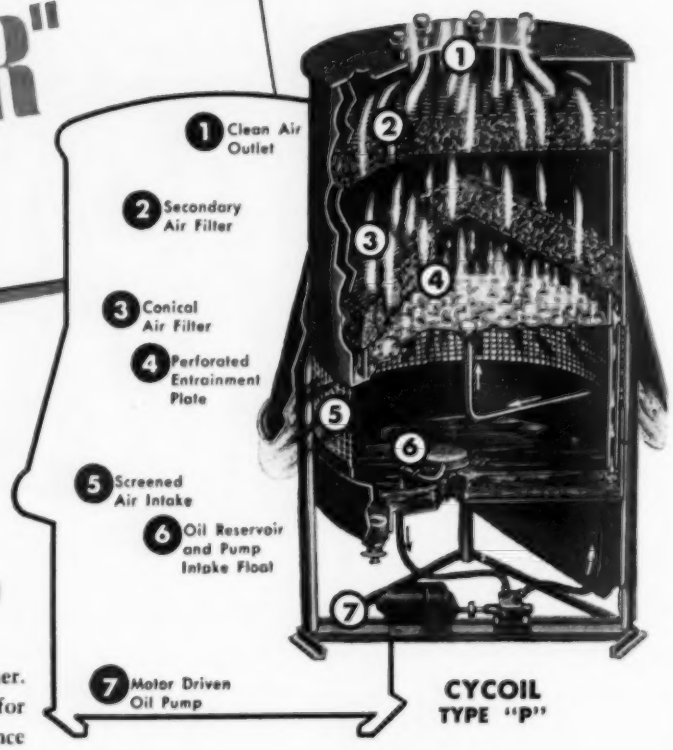
URSA OILS FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES

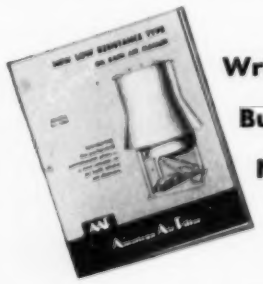
Rx Just what the "DOCTOR" ordered!


1 Clean Air Outlet
2 Secondary Air Filter
3 Conical Air Filter
4 Perforated Entrainment Plate
5 Screened Air Intake
6 Oil Reservoir and Pump Intake Float
7 Motor Driven Oil Pump
CYCOIL TYPE "P"

NEW LOW RESISTANCE CYCOIL OIL BATH AIR CLEANER KEEPS PACE WITH MODERN ENGINE DESIGN

The "doctor" in this instance was the engine designer. Wider use of turbo-chargers and pressure blowers for scavenging dictated the need for a new low resistance oil bath cleaner.

The Type "P" Cycoil utilizes a new principle in oil bath air filters—a perforated entrainment plate. The plate, over which oil flows from a central distributing head, is placed in the air stream. Its metered orifices are calibrated to increase the velocity of air flow through the openings to entrain the oil that tends to spill over the edges and distribute air flow uniformly over the area. With entrainment accomplished, the air then passes upward through primary and secondary filters for removal of its dust and oil content.



Write For Bulletin No. 160

The new low resistance Cycoil is available in two types —(1) Type "P" with standard metered orifices for engines operating from 50% of rated capacity to maximum rating and (2) Type "PV", which by adding Vari-flow valves to orifice openings, assures sustained high cleaning efficiency from as low as 10% of rating to full capacity. For complete product information, call your local AAF representative or write direct for Bulletin No. 160.

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408 Central Avenue, Louisville 8, Kentucky
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DIESEL and GAS ENGINE PROGRESS

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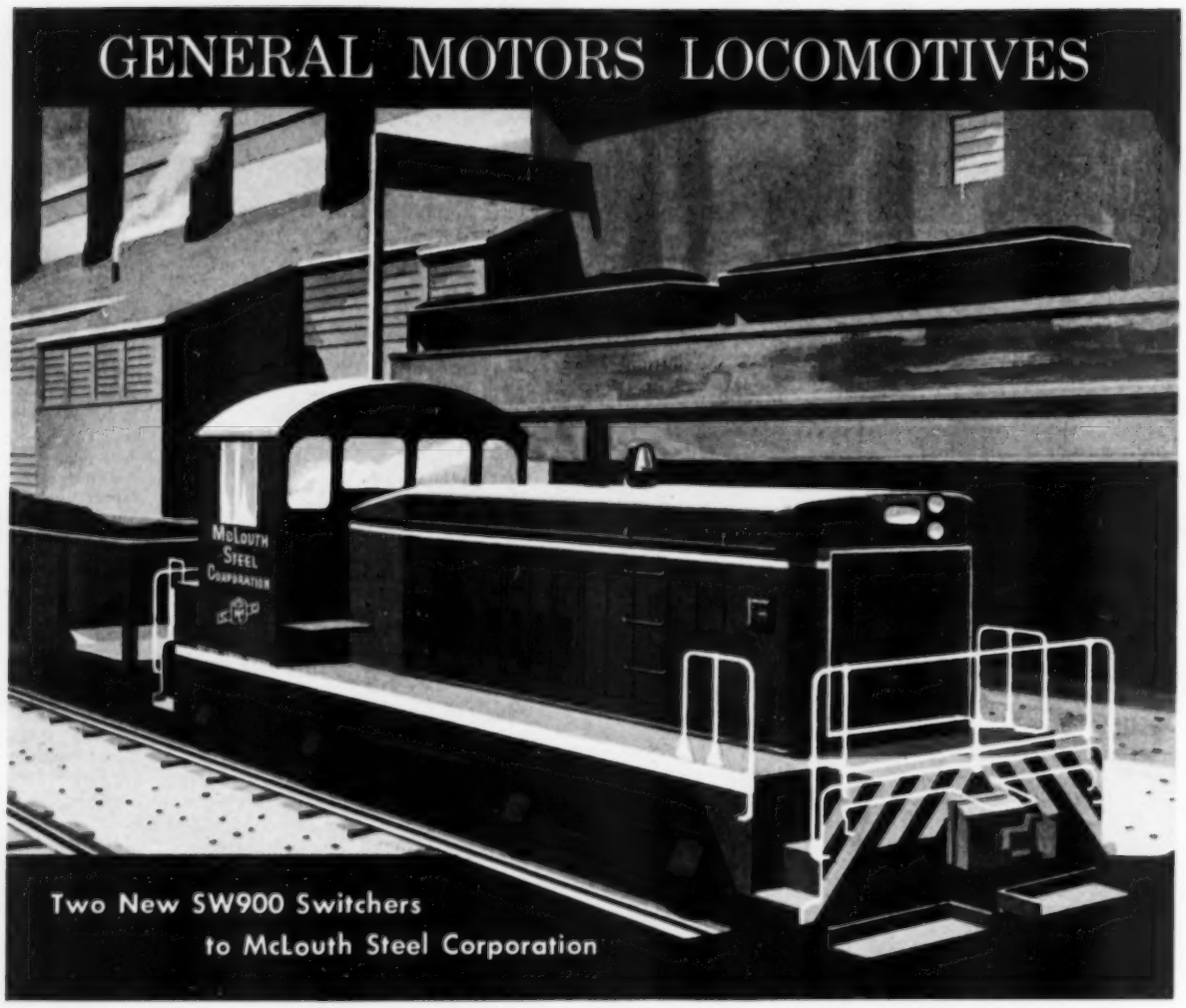
FRONT COVER ILLUSTRATION

A gigantic Kenworth logging truck powered by a 300 hp. Cummins diesel is pictured at work in a White River, Washington logging operation for Weyerhaeuser. The truck is one of the largest in the world.

Great new line of

GENERAL MOTORS LOCOMOTIVES



Two New SW900 Switchers
to McLouth Steel Corporation

New General Motors SW900 heavy-duty switchers have 105 to 125 tons on drivers and 12½% more horsepower. These 900-horsepower units cost less to buy and less to run than 1000-hp switchers and can handle services usually assigned to the bigger units.

General Motors locomotives pay for themselves faster because they do more work at less cost. One reason is that parts and components cost less, last longer. And design improvements in new General Motors locomotives mean even longer parts life—mean that

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Random Thoughts from a Filter Engineer

by Dick Brown

- **ENGINEERS DO HAVE IMAGINATION!**
- **WHAT'S THE BIG NOISE IN SILENCERS?**
- **HOW TO MAKE MONEY BY BREAKING EVEN**

ENGINEERS DO HAVE IMAGINATION!

It's fashionable these days to accuse us engineers of not being able to see beyond our slip sticks. We're supposed to be great when it comes to exact calculations but not much when imagination is needed. Don't believe it. Engineers, like writers, are often inspired to real creation. Call it a creative hunch, if you like, but it definitely exists.

For instance, we're proud of a bit of inspiration one member of our engineering department came up with. The idea of a self-cleaning, curtain type filter is not new. But the idea behind Air-Maze's new cleaning action —called "pulse-type" action—*is* new.

Automaze

All self-cleaning filters submerge each panel of the revolving curtain in a cleaning tank at the bottom. But Automaze, (below right), Air-Maze's new self-cleaning filter, goes a step further. It vigorously agitates each panel 6 or more times in the oil bath, gets it *really* clean.

The problem was to find a way of forcefully moving each panel back and forth in the oil bath so that it would be thoroughly cleaned. The solution: a compressed air drive that gives exactly the quick, forceful motion required. It's an Air-Maze exclusive. And a good example, we think, of the kind of imagination that filter users have come to expect from Air-Maze.

WHAT'S THE BIG NOISE IN SILENCERS?

Silence, like Einstein's theory, is a *relative* matter (if you'll pardon a pun). A noise in church doesn't have to be too loud to sound like the arrival of the devil himself. But the same noise in a busy office probably wouldn't cause a secretary to look up from her crossword puzzle. What's objectionable depends on the base level of noise.

Air-Maze In-Line Silencer

Same idea applies when we design silencers for diesel engines. If someone asked us to, we could probably build a silencer that would dampen almost *all* intake noise. But nobody's ever asked us. First, because it would cost far too much and be too big to be practical. Second, because the only *objectionable* part of the intake noise is the part that stands out from the "crowd" of other engine noises that can't be silenced. No one wants to pay for silence he can't "hear".

That's why, in designing Air-Maze silencers, we compromise silence with savings. Most noise is composed of a group of vibrations and we engineer our silencers to dampen the most common combinations of objectionable noise. Our customers like the idea because they get rid of the noise that annoys and don't have to pay extra for silence they can't enjoy.

HOW TO MAKE MONEY BY BREAKING EVEN

Once in a while someone asks us why we knock ourselves out over a small order of little breather filters that sell for less than a dollar apiece. The easiest answer, we suppose, is to point out that we're possibly the largest specialized breather manufacturer in the country. But that would be evading the question because it wasn't always that way and, true enough, we don't think anyone ever got rich on breathers.

But, as we've discovered, breaking even *can* be a money-making way to do business. And breather filters are a case in point. They may be small fry in the filter universe—but not to the man in a customer's plant who's responsible for their performance. And not to us because it's been our program for 29 years to provide the designer with nearly everything he needs to filter air or liquids, treating the little breathers as "equals" to their big brothers in the Air-Maze line. And it's probably not just coincidence that, today, some of our biggest customers for a variety of Air-Maze products first got to know us after we "knocked ourselves out" to land their small orders for breather filters years ago. The Air-Maze Corp., 25000 Miles Avenue, Cleveland 28, Ohio.

Air-Maze Breather

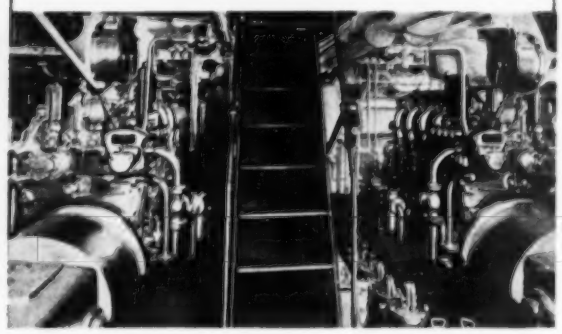
AIR-MAZE

The Filter Engineers

AIR FILTERS • SILENCERS • SPARK ARRESTERS
LIQUID FILTERS • OIL SEPARATORS • GREASE FILTERS

Pakanbaru and Padang, Too

The CALTEX PADANG, Caltex Pacific Petroleum Maatschappij river tanker designed by the Marine Technical Staff of Caltex. Built by L. Smit & Zoon, Kinderdijk, Holland, the 260-ft. shallow-draft tanker has a loaded displacement of 4185 long tons and is powered by two 8-cylinder Model 278A General Motors Diesel Engines shown in photo below.



both powered by

GM DIESEL

Over a year ago the tanker, CALTEX PAKANBARU, powered by two General Motors Diesel engines, went into service hauling crude oil down the narrow, winding Siak River in Central Sumatra.

This March a second GM Diesel-powered shallow-draft tanker, the CALTEX PADANG, went into service on this same run.

Instant response to the captain's commands and round-the-clock dependability are two big reasons why both ships are powered by General Motors Diesel engines built by Cleveland Diesel Engine Division. And it's for the same reasons that leading tugboat and towboat operators specify GM Diesels.

Call or write your nearest Cleveland Diesel Engine Division Office for full details on dependable, low-cost power for your water transportation needs.

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Good Tips are mighty important!

Tests by a leading railroad show improperly cleaned spray tips caused 11% drop in horsepower, 1.7% efficiency loss in one year.

Proper maintenance of equipment is a major problem for any railroad, and much time, effort and money are expended to keep power plants functioning at peak efficiency.

Even the smallest type of equipment such as the spray tips on your fuel injection equipment can cause serious efficiency losses unless properly maintained, as evidenced by recent tests made by one of America's leading railroads.

To assure that operators get full performance out of Bendix Fuel Injection Equipment, we have prepared a special folder showing the best proven method of maintaining the original high polish on spray tips in order to reduce carbon deposits to a minimum.

Send today for your copy of the Bendix bulletin, "How To Clean Spray Tips".

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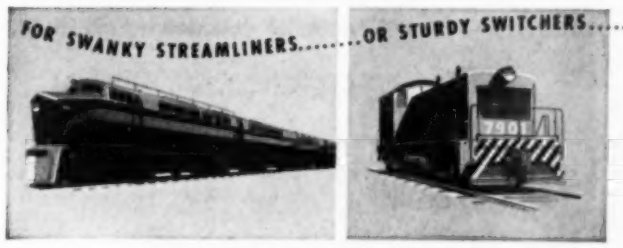

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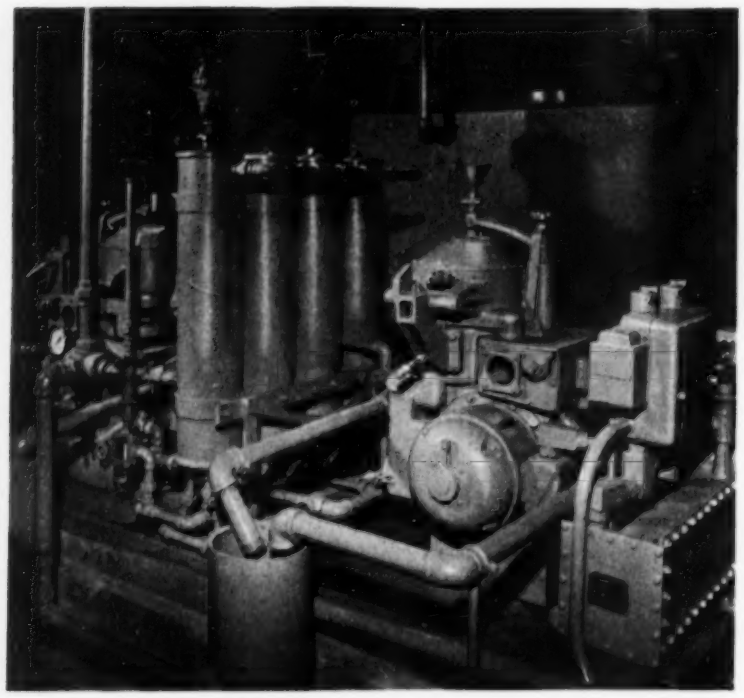
YOU KNOW you're safe when a De Laval "Puri-filter" guards your Diesel Lube Oil...



YOU KNOW that every bit of solid contaminant is being removed—even down to particles as fine as *one micron* (0.000039 in.) . . . . .

YOU KNOW that every drop of water is being taken out of the oil . . . . . .

YOU KNOW that ring sticking is being practically eliminated, time between crank case cleanings stretched out, oil life prolonged . . . . . .

YOU KNOW that you've provided the utmost in dependability—a De Laval "Puri-Filter" will never let you down.

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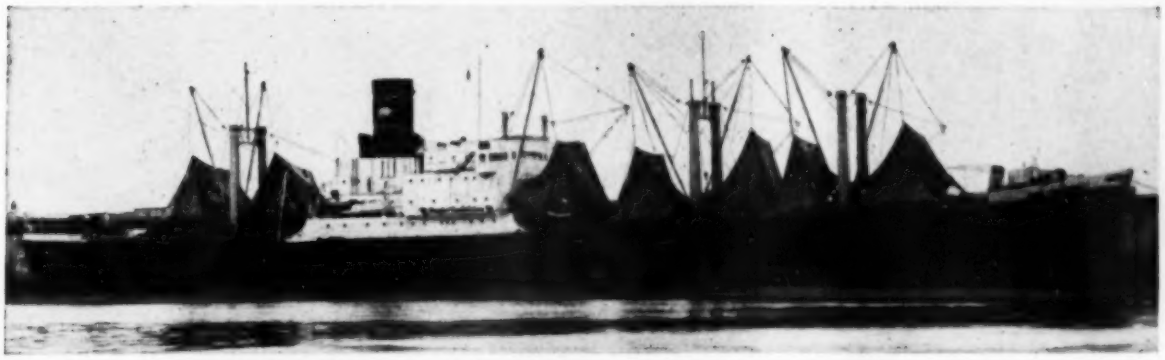
DE LAVAL

LUBRICATING OIL PURIFIERS

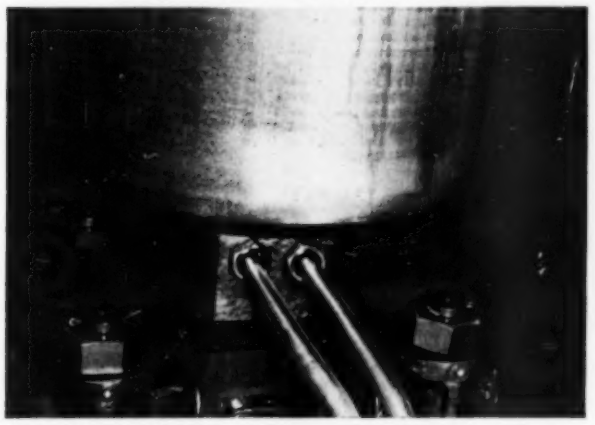
The Engineer's Report.

CASE HISTORY
PRODUCT *RPM Delo Marine Lubricating Oil*
FIRM *Pacific Far East Lines, Inc., San Francisco*

New lubricating oil cuts costs on motorships!



RPM DELO Marine Lubricating Oil, a new detergent-type oil, lubricates the big Sun-Doxford diesel propulsion engines in Pacific Far East Line's M.V. Sea Serpent. Especially developed for cylinder and bearing lubrication in high-output, low-speed marine diesels, this special oil minimizes the problem of deposit formation in engines. It keeps them cleaner even where the heavier residual fuels are used. Special compounding in RPM DELO Marine Lubricating Oil inhibits engine deposits, helps keep lacquer off cylinder liners and reduces wear. Records from actual operations show that this oil can cut maintenance costs on big diesels up to 30% and greatly reduce oil consumption. RPM DELO Marine Lubricating Oil is available in viscosity grades SAE 30, 40 and 50.



AVAILABLE IN MANY PORTS. RPM DELO Marine Lubricating Oil is stocked for ship operators in all principal ports throughout the nation.

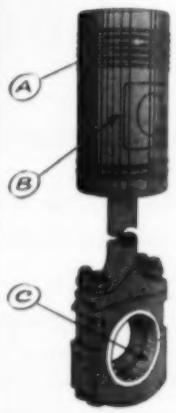
Standard Marine Fuel and Lubricant Engineers are stationed in the following ports: Seattle, Portland, San Francisco, Oakland, and Los Angeles Harbor area. They will give ship operators expert help at any time.

FOR MORE INFORMATION about RPM DELO Marine Lubricating Oil or other petroleum products, or the name of your nearest distributor, write or call any of the companies listed below.

RPM DELO LUBRICATING OILS

TRADEMARK "RPM DELO" REG. U.S. PAT. OFF.

How RPM DELO Marine Lubricating Oil keeps engines clean and prevents wear



A. Highly effective compounding inhibits deposits...solves residual fuel carbon problems in low-speed marine diesels ...cleans dirty engines, keeps new engines clean, helps prevent scuffing.

B. Special anti-oxidant additive resists formation of lacquer and prevents ring-sticking. Film stays on parts whether hot or cold, running or idle.

C. Corrosion and foam inhibitors stop bearing corrosion, prevent foaming in wet or dry sump engines.

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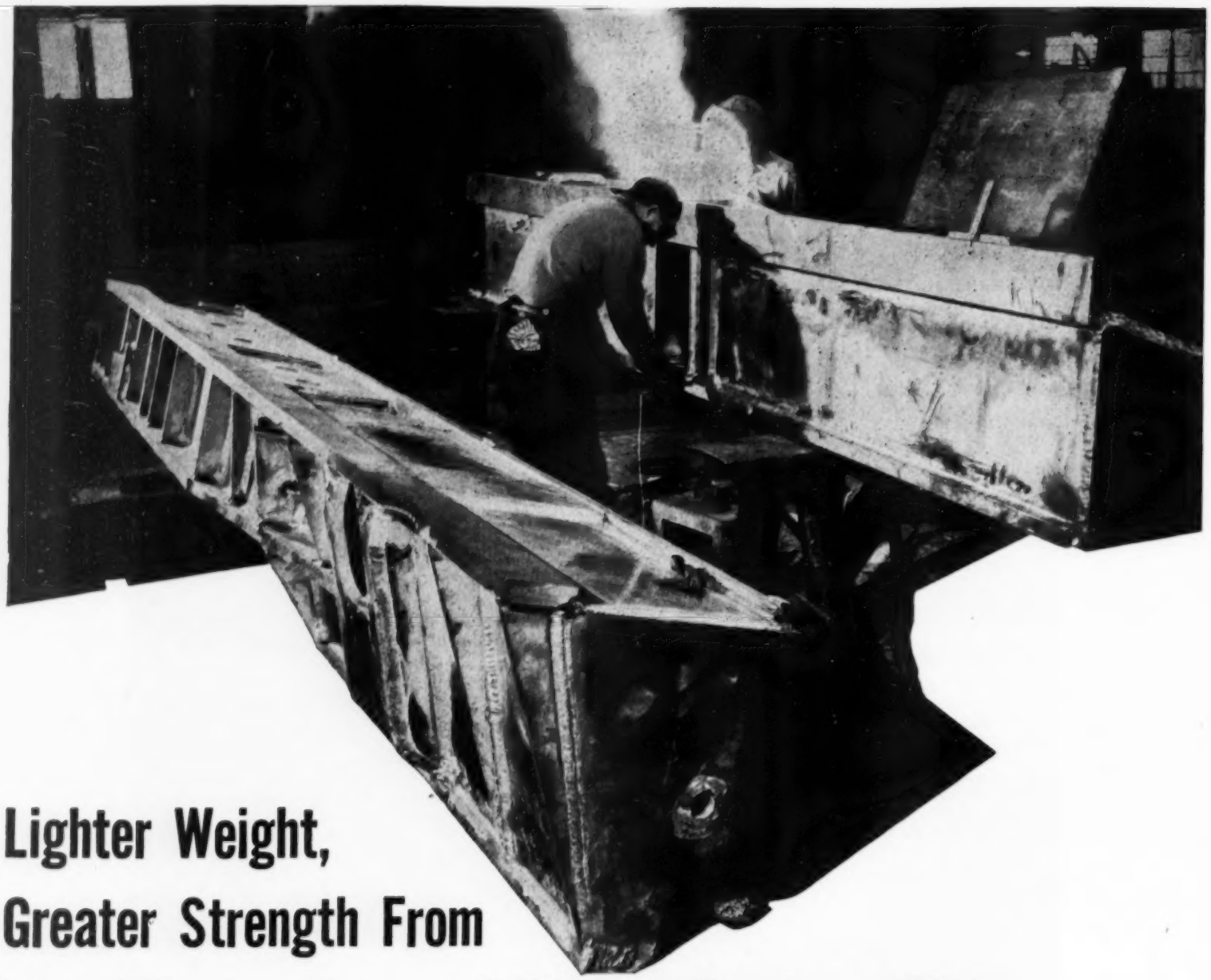

Lighter Weight, Greater Strength From Diesel Engine Bases of Welded Aluminum Plate

BENEFITS PROVED IN ALUMINUM PISTONS, HEADS AND CRANKCASE-CYLINDER BLOCKS ARE APPLIED TO DIESEL ENGINE BASES

Engine bases seventeen feet long are being welded from aluminum plate—swinging open the door to ideas previously considered impractical. With this type of fabrication, designers, builders and users of diesel power can make use of aluminum's lighter weight, greater strength and shock resistance. The technique is an Alcoa development; the fabrication is being done by REPUBLIC STRUCTURAL IRON WORKS in Cleveland, Ohio.

Aluminum weldments are one more product of close co-operation between engine designers and our own development and research specialists. The facilities they used in producing new alloys and new processes are yours for the asking. So, ask your Alcoa sales engineer about them today. Call your nearby Alcoa sales office—listed under "Aluminum" in the classified section of your telephone directory, or write: ALUMINUM COMPANY OF AMERICA, 1987-J Alcoa Building, Pittsburgh 19, Pa.

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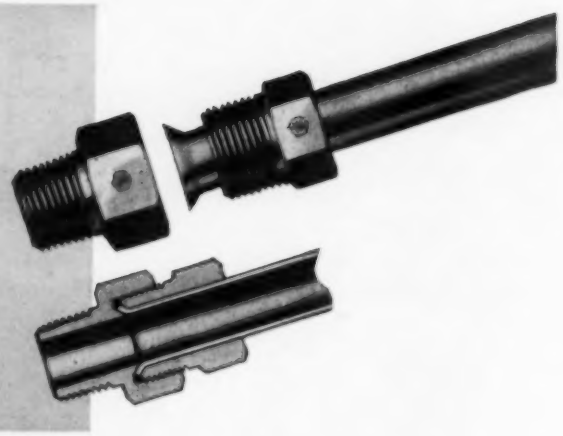

BACKED BY THE WORLD'S GREATEST PERFORMANCE RECORD!

Inverted Flare Fittings are a Weatherhead invention backed by a 27-year record of dependable performance. Original equipment on all makes of cars, they assure leakproof and trouble-free connections for any gas, oil, or hydraulic application at any pressure up to 1500 psi. Here are the reasons:

1. **TWO-PIECE DESIGN**—Weatherhead Inverted Fittings consist simply of the body and the tube nut. Once the flare is made, *the right way is the only way* assembly can be made. No sleeve to lose or misapply. Inventory and stocking problems are minimized.

2. **HIGH STRENGTH**—Precision machining from extruded brass stock provides strength equal to forgings and far superior to castings. Built to withstand end pull and bending stresses without leakage. Dry seal pipe threads are standard.

3. **REUSABLE—CUTS COSTS**—Weatherhead Inverted Fittings can be disconnected and reassembled repeatedly without affecting the quality of the joint.

4. **COMPLETE LINE**—Weatherhead's complete line of inverted fittings includes standard nuts, male and female connectors, unions, male and female elbows, tees and adapters.

WHATEVER YOUR NEEDS, you can meet them from the Weatherhead line of brass tube and pipe fittings including: S. A. E. 45° Flare, Compression; S. A. E. 37° Flare, Pipe and Threaded Sleeve connectors. Write for Catalog F-1456. The Weatherhead Company, Dept. M-3, 300 E. 131st St., Cleveland 8, Ohio.

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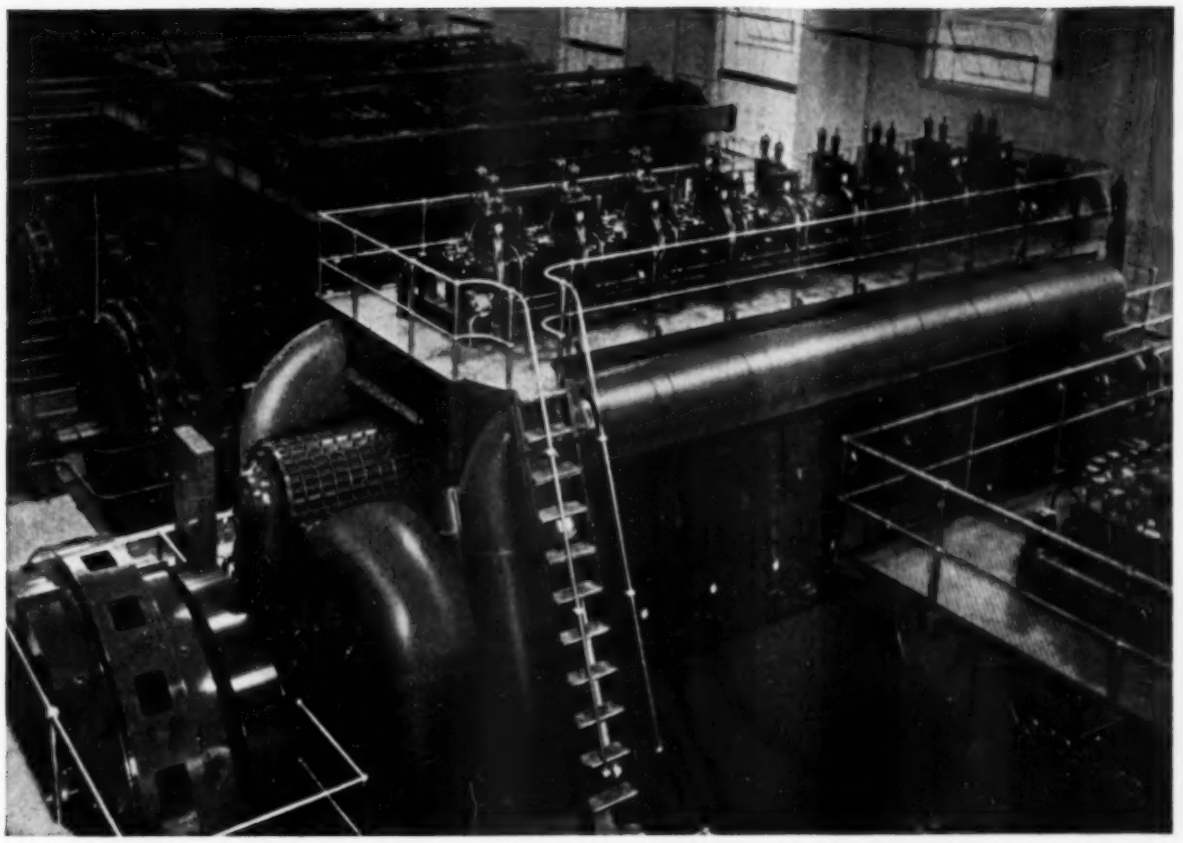
This trademark (W) appears on every make of car, truck, bus, and tractor (W) on equipment for machine tools, diesel and hydraulic applications (W) on equipment for instrumentation, oil drilling, mining, road building (W) for aircraft, railway, and marine engines (W) for LP-Gas and anhydrous ammonia control equipment (W) this symbol represents more than 1500 products made by Weatherhead . . .



Largest Diesel Power Generating Station in the U.S.

reduces cylinder and piston ring wear with SHELL ROTELLA OIL

Electric power for the City of Grand Haven, Michigan, and the surrounding area, is generated by diesel engines in the largest municipal power station of its kind in the U. S. A. Shell Rotella Oil is the cylinder lubricant.

The anti-corrosive action in Shell Rotella Oil combats the major cause of engine wear . . . cylinder and piston ring wear caused by acid action from the by-products of incomplete combustion and condensation.

Tougher lubricating film in Shell Rotella Oil gives cylinders and rings greater protection . . . minimizes wear. Its effective detergent-dispersant action prevents harmful deposits.

Write for technical information. See for yourself how Shell Rotella Oil can help reduce your engine maintenance costs.

SHELL OIL COMPANY
50 WEST 50TH STREET, NEW YORK 20, NEW YORK
100 BUSH STREET, SAN FRANCISCO 6, CALIFORNIA

SHELL

Link-Belt Model K-595 dragline working for Strasburg Clay & Coal Company near Baltic, Ohio. Rig has 3½-yard bucket, 80-foot boom.

"Doubles cable life – cuts operating costs"

THAT's what Edward "Rusty" McGinness, owner of the Strasburg Clay & Coal Company, reports after 5000 hours' tough stripping with his TORQMATIC-equipped Link-Belt dragline.

And with the Allison TORQMATIC Converter automatically absorbing shock loads he's kept repairs to a minimum—only $24.00 in replacement parts on the drag, no repairs to the converter. The rig strips 100 tons of coal a day, uses 6 gallons of low-cost Diesel fuel an hour.

At first, Rusty was skeptical about having a TORQMATIC Converter. Now he calls it the "best unit ever made for a rig." And he should know—he's been in the coal business 15 years, has run every kind of mining equipment. Rusty reports the torque converter automatically protects cables, boom and engine from damage by absorbing sudden shocks.

There's a TORQMATIC Converter for a wide range of hard-working units from 40 to 400 horsepower. TORQMATIC DRIVES, the *matched* converter-transmission team, cut costs and boost production in trucks, scrapers, and other big equipment.

Many operators have converted their direct-drive units to TORQMATIC DRIVES to get better performance and longer equipment life. Ask your equipment manufacturer or dealer about Allison TORQMATIC DRIVES in your units. For engineering details and specifications, write direct.

Allison Division of General Motors
Box 894D, Indianapolis 6, Ind.

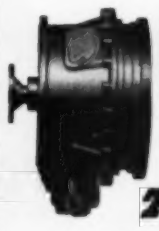
ALLISON TORQMATIC CONVERTER

Simple Design – one-piece cast converter elements – minimum maintenance

Compact, easy to install in existing equipment

Designed for power applications in the 40 to 400 hp range

Longer Equipment Life – absorbs shock, eliminates engine lugging, cuts maintenance costs

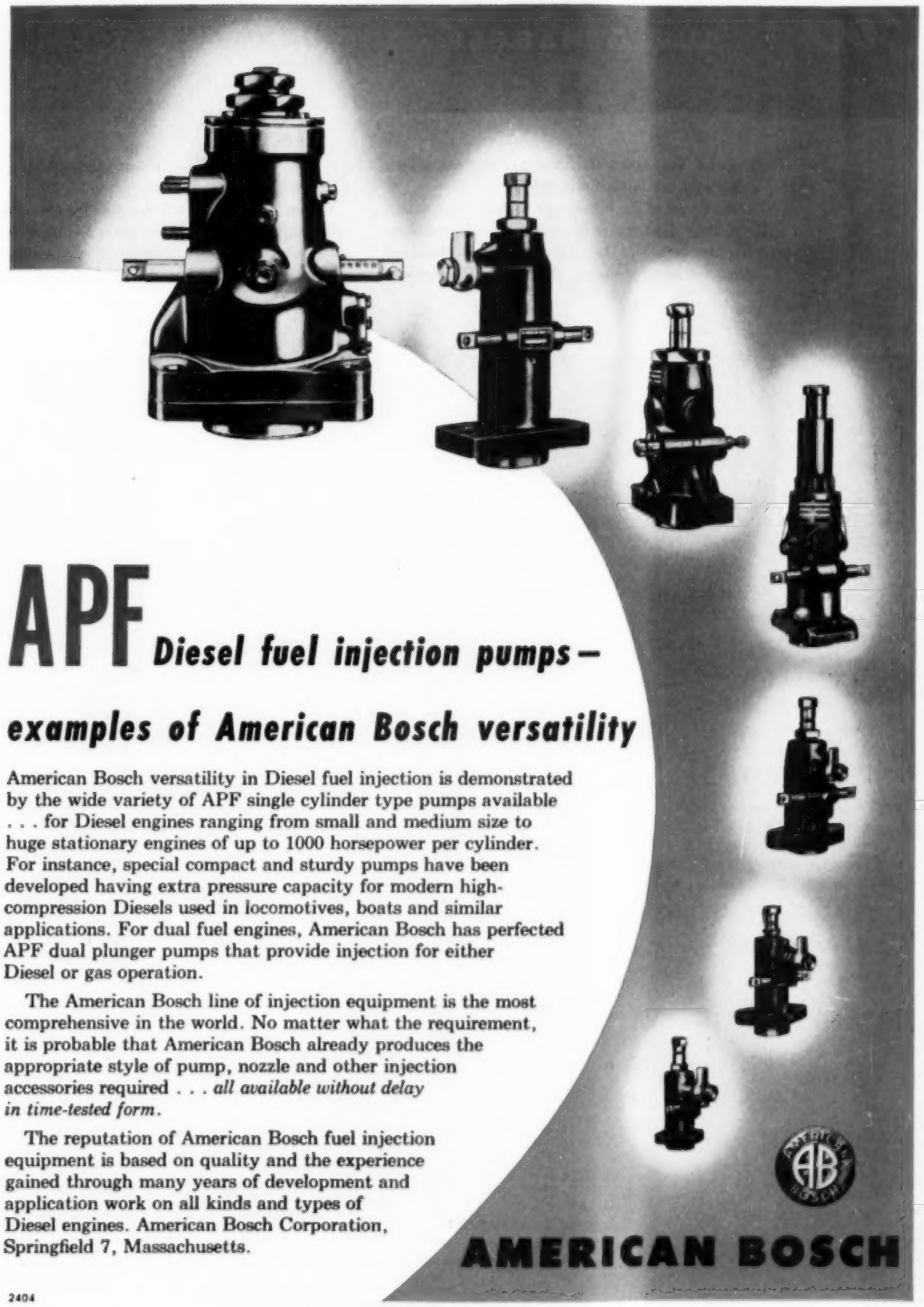


GM GENERAL MOTORS

Allison

TORQMATIC DRIVES

COMPACT, EFFICIENT HYDRAULIC DRIVES FOR CRANES • TRUCKS • TRACTORS • SCRAPERS • SHOVELS • DRILLING RIGS



APF *Diesel fuel injection pumps—*

examples of American Bosch versatility

American Bosch versatility in Diesel fuel injection is demonstrated by the wide variety of APF single cylinder type pumps available . . . for Diesel engines ranging from small and medium size to huge stationary engines of up to 1000 horsepower per cylinder. For instance, special compact and sturdy pumps have been developed having extra pressure capacity for modern high-compression Diesels used in locomotives, boats and similar applications. For dual fuel engines, American Bosch has perfected APF dual plunger pumps that provide injection for either Diesel or gas operation.

The American Bosch line of injection equipment is the most comprehensive in the world. No matter what the requirement, it is probable that American Bosch already produces the appropriate style of pump, nozzle and other injection accessories required . . . *all available without delay in time-tested form.*

The reputation of American Bosch fuel injection equipment is based on quality and the experience gained through many years of development and application work on all kinds and types of Diesel engines. American Bosch Corporation, Springfield 7, Massachusetts.

2404

AMERICAN BOSCH

New DE LAVAL TURBOCHARGER *offers highest pressure ratios and efficiencies*

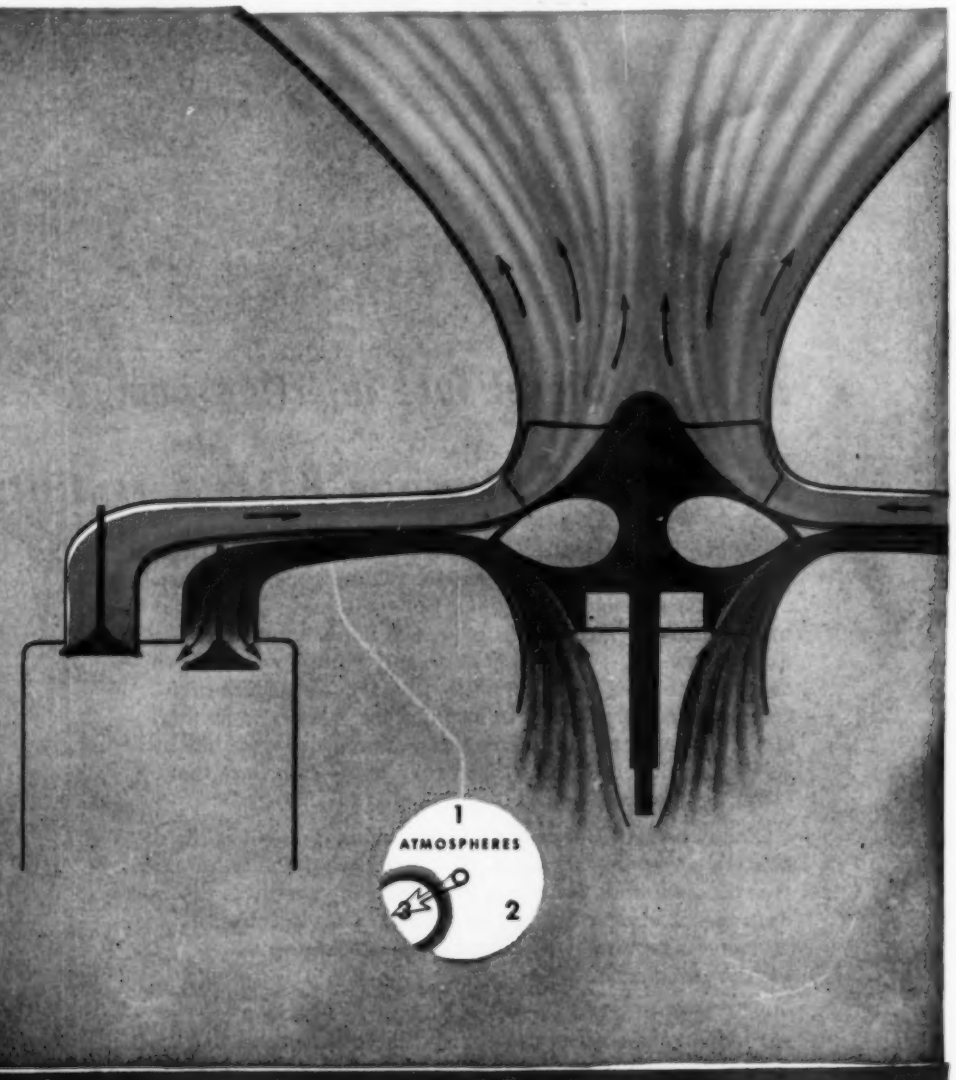
De Laval Turbochargers for diesel engines utilize a radically new design principle.

As a result of the Monorotor construction shown here, these De Laval units are capable of producing pressure ratios of 3:1 for continuous full-load operation of the engine and higher for engine overload ratings. Compressor and turbine efficiencies are extremely high.

Other Monorotor advantages are exceptional simplicity, comparatively few parts and light weight, in spite of very rugged construction.

Write for specification data on your application.

- Rotor is constructed entirely of *alloy steels.*
- Turbine blades and turbine hub, made from a highly heat-resisting cobalt alloy, are an integral structure. This provides the *highest possible safety factor.*
- Turbine rotor is *air-cooled,* for safe operation with any temperature encountered in reciprocating engine service.
- Design of all flow passages *minimizes possibility of clogging.*
- Turbine nozzle box or turbine housing is *not* water-cooled. Thus there is only *negligible heat rejection* to engine cooling system.
- Turbine nozzle guide vanes are *adjustable,* for matching turbocharger to engine.
- Shaft end is *free* for driving lubricating system, tachometer and other accessories.



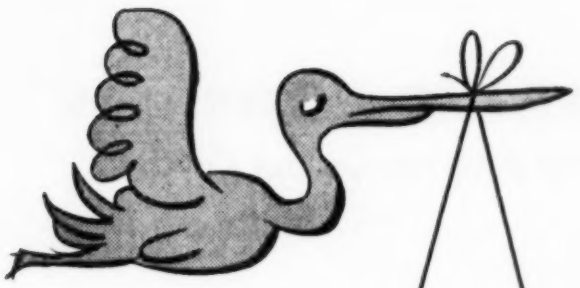
EXCLUSIVE MONOROTOR CONSTRUCTION

This is one of 4 sizes of De Laval B-Type Turbochargers

DE LAVAL *Turbochargers*

DE LAVAL STEAM TURBINE COMPANY
883 Nottingham Way, Trenton 2, New Jersey

A NEW ARRIVAL



To the Petter air-cooled diesel engine family

1½ & 2½ H.P.

Range NOW 1½ - 40 H.P.

BACKED BY A WORLD-WIDE PARTS AND SERVICE ORGANISATION FOR THE 360,000 ENGINES IN USE

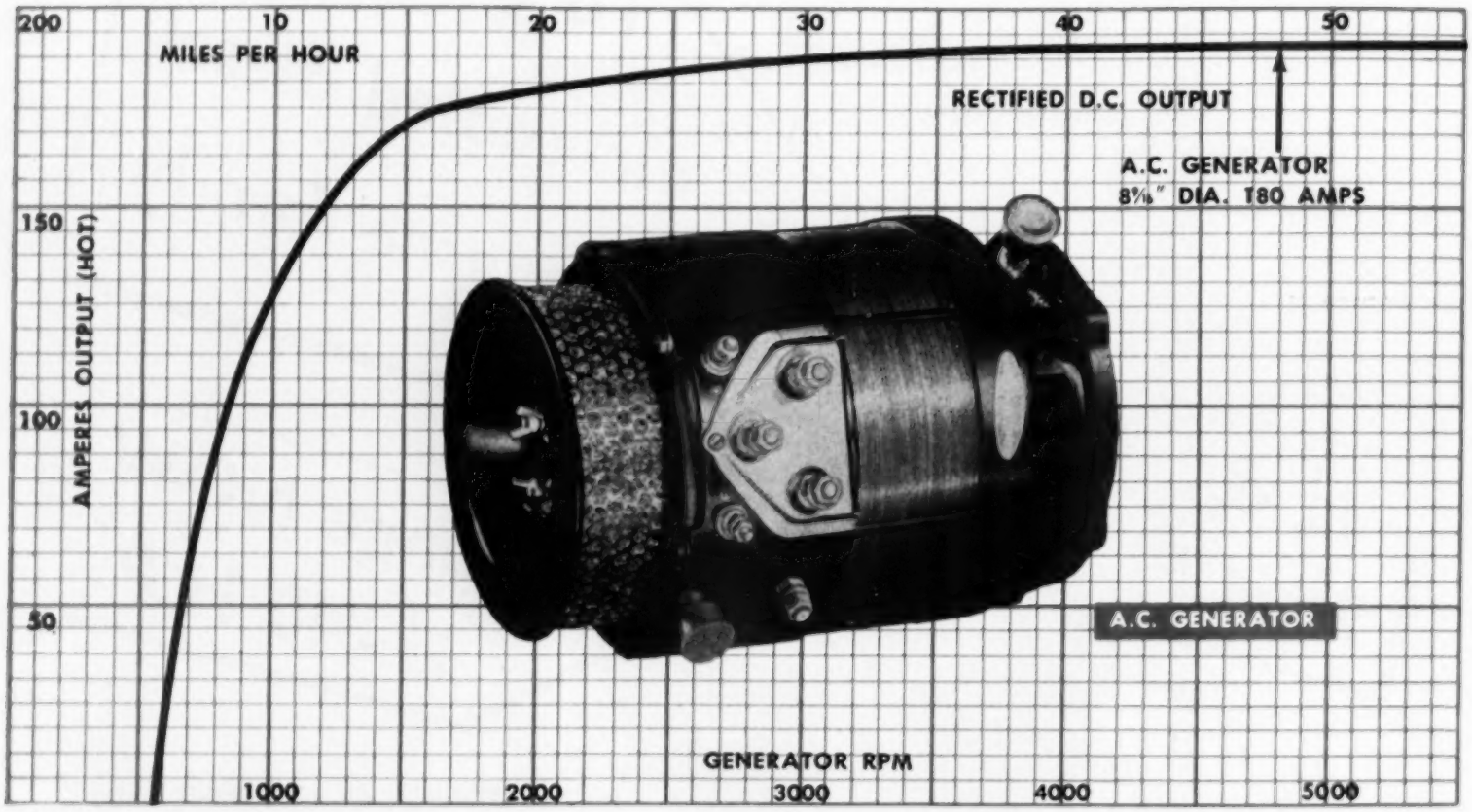
WRITE FOR INFORMATION
A FEW CHOICE DISTRIBUTORSHIPS OPEN

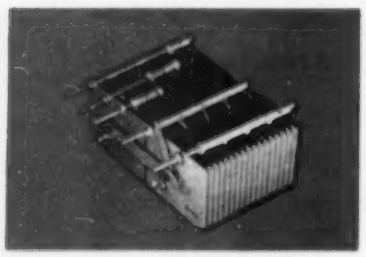
THE PETTER SMALL ENGINE DIVISION OF BRUSH ABOE, INC.
Office and Showroom 60-07 39th AVE. WOODSIDE, NEW YORK

Power Packed and

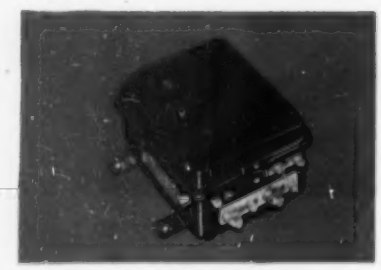
DELCO-REMY A. C. GENERATOR

Heavy-Duty 180-Ampere Output Capacity





Rectifier



Regulator

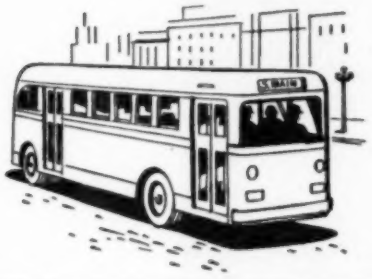
The Delco-Remy A.C. generator is the heart of a 12-volt A.C.-D.C. electrical system designed specifically for modern buses with fluorescent lighting and extra-heavy electrical loads.

Desirable performance characteristics include cut-in at approximately 550 generator rpm . . . maximum output of 180 amperes at approximately 2000 rpm. The new generator supplies not only alternating current for fluorescent lights but also ample direct current for the heaviest electrical loads coupled with lengthy engine-at-idle periods.

Impressive features of the new generator are its light weight, its very high output capacity, and its ability to operate over a wide speed range with greatest efficiency. Specify Delco-Remy electrical equipment on your new buses.

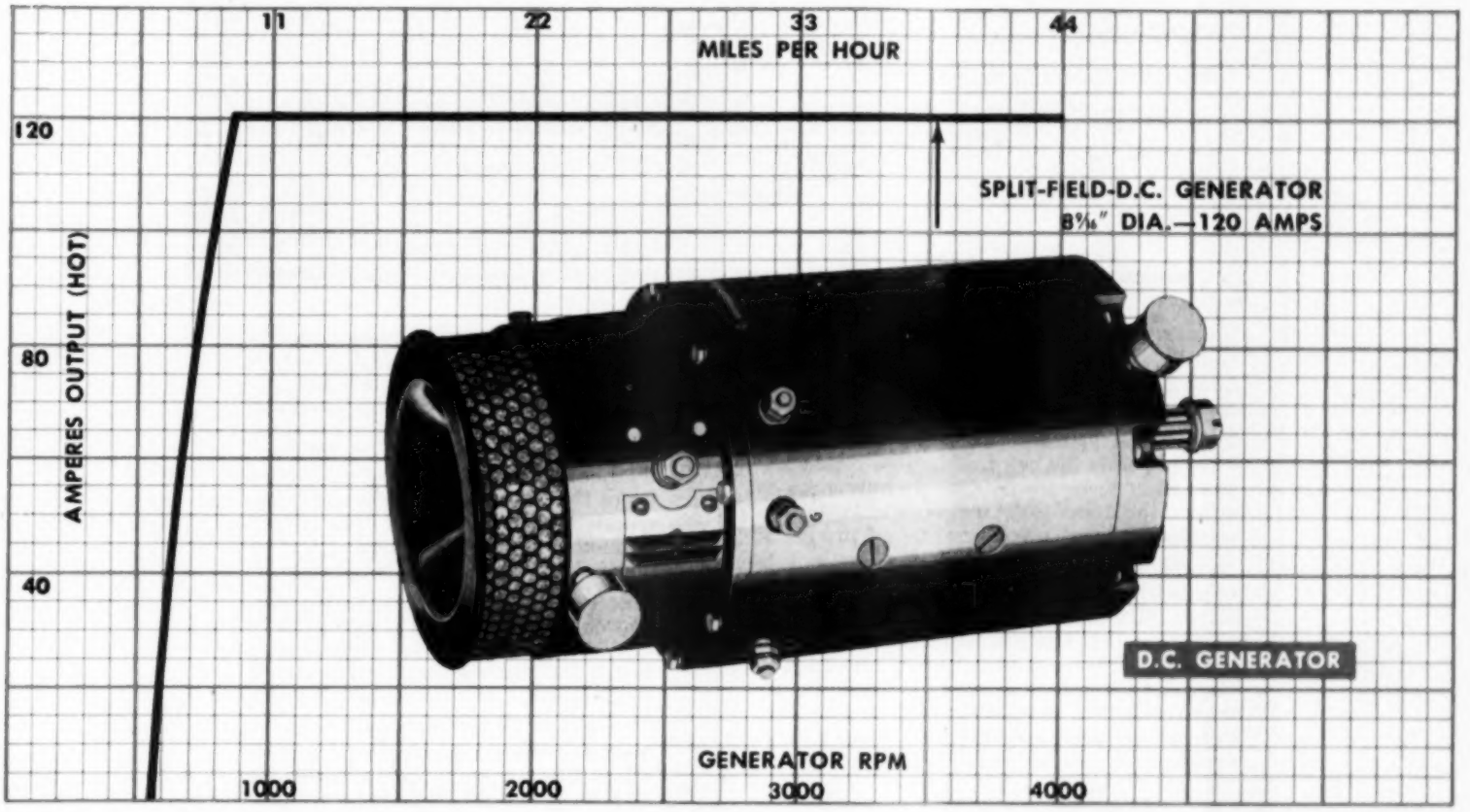
WHEREVER WHEELS TURN OR PROPELLERS SPIN

Right for the Job



DELCO-REMY D. C. SPLIT-FIELD GENERATOR

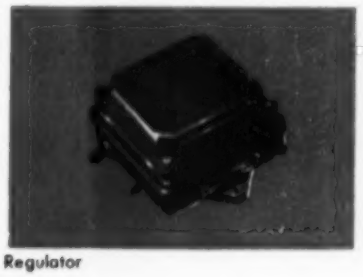
Heavy-Duty 120-Ampere Output Capacity



The Delco-Remy 12-volt split-field generator and its companion regulator are rugged and dependable—designed to meet the needs of transit buses having increased electrical loads coupled with a high percentage of engine idling time.

Desirable performance characteristics include low cut-in, high output at engine idle, and quick attainment of maximum output. Cut-in occurs at approximately 550 generator rpm; output reaches 70 amperes at approximately 700 rpm, maximum controlled output of 120 amperes above 850 rpm.

Operating benefits include reduced battery cycling, long battery life, and a simplified electrical system with sustained voltage—at no sacrifice in ruggedness or dependability. Specify Delco-Remy electrical equipment on all of your new buses.



Regulator

Delco-Remy

DIVISION, GENERAL MOTORS CORPORATION, ANDERSON, INDIANA

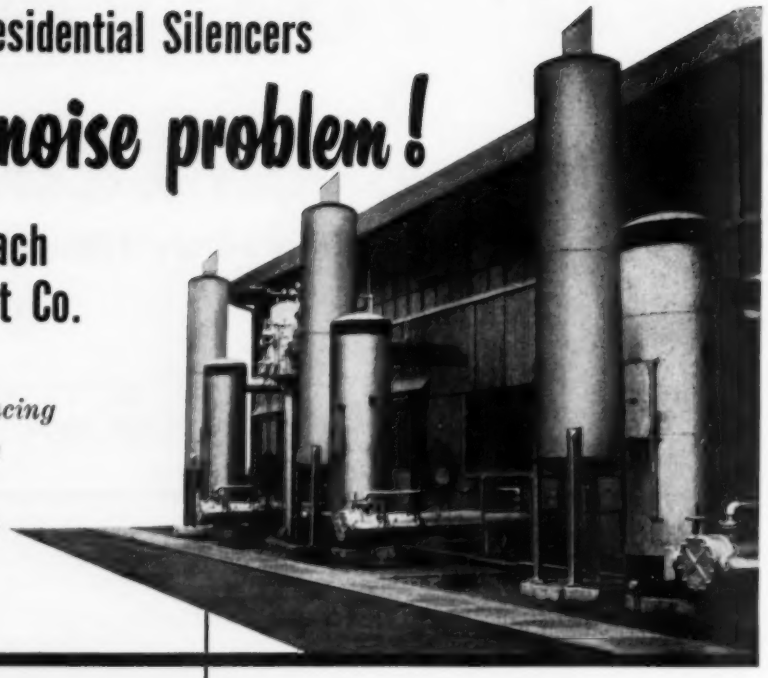
WHEREVER WHEELS TURN OR PROPELLERS SPIN

Kittell ECS-16 Residential Silencers

lick tough noise problem!

for Long Beach Oil Development Co.

Provide extreme silencing without reducing engine efficiency; prevent complaints from nearby residential area



When the Long Beach Oil Development Company built this recycling plant recently for the City of Long Beach, silencing the three Clark RA5 gas engines held top priority.

The plant is located close to the water's edge, directly across the bay from a large residential area. Since there are no natural obstructions to reduce the noise, good neighbor relations demanded maximum silencing of the exhaust gases.

To solve the problem, Kittell engineers recommended that each engine be equipped with a Kittell ECS-16, four-chamber residential-type silencer, modified for side inlet and equipped with mounting legs as shown above. These highly-efficient units were developed specifically for use near residential, hospital or other areas where extreme silencing is required. To date, not a single complaint of noise has been received.

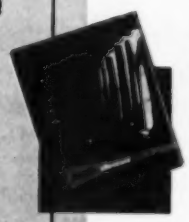
ENTIRELY DIFFERENT DESIGN PRINCIPLE USED! As in all Kittell Silencers, the ECS-16 uses a unique method to control, and thus silence, hot exhaust gases. Kinetic energy in the moving mass of air guides the gases through a series of louvres, smoothing out the pulsations and producing a whisper-quiet flow. A special perforated tube quickly bleeds off the hot bursts as they enter the silencer, eliminating loss of power due to atmospheric back surge.

LONG LIFE; LOW MAINTENANCE! Large, free-flowing passages prevent plugging due to excessive carbon or sludge deposits. This feature and the rugged, heavy steel, all-welded construction, assure long life with minimum maintenance.

IMMEDIATE DELIVERY! Standard models of all Kittell Silencers are quickly available for all types of engines. Write today for your copy of the Kittell catalog. It's free!

There's a Kittell Silencer and Spark Arrestor for every requirement—big or small!

- Gas and diesel engines
- Steam generators
- Drilling rigs
- Pumping units
- Generator sets
- Compressors and blowers
- Boats and ships
- Heavy construction equipment
- Trucks and buses
- Logging and mining machinery



SPECIAL PURPOSE SILENCERS! Stainless steel, ceramic coated, and other special purpose silencing equipment can also be supplied. Prices and delivery quoted to your specifications.

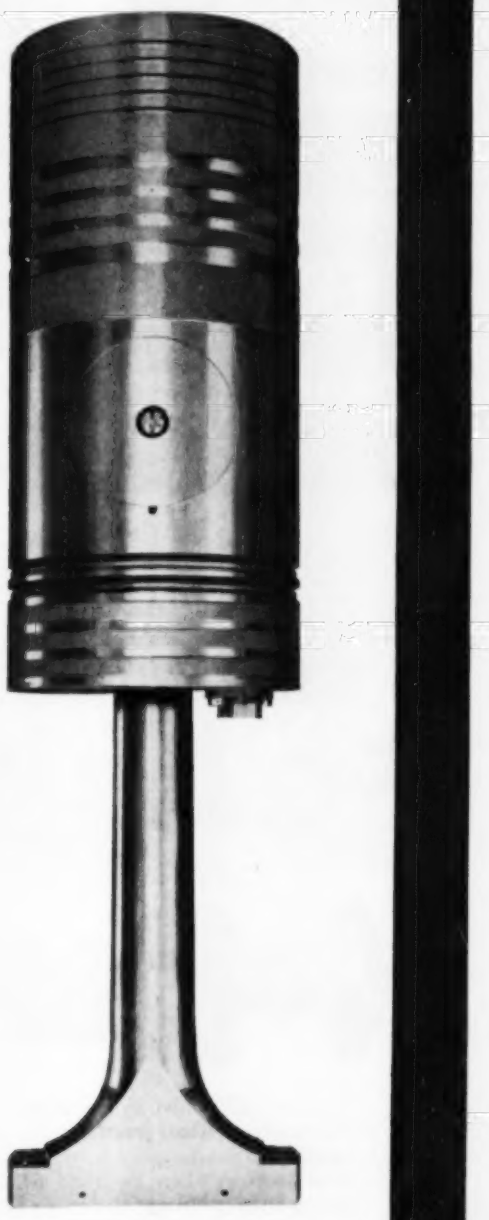
"15 years of silencer engineering and fabricating experience"

Kittell Muffler & Engineering Inc.

915 South Santa Fe Avenue • Los Angeles 21, California

Q. How can the Hamilton Diesel burn heavy oil so cleanly?

A. *The Hamilton Diesel has a semi-hemispherical combustion chamber and exclusive rotary valve and port design. These produce excess combustion air, large combustion volume and high turbulence. Result: efficient burning of the heaviest residual fuels...with clean exhaust and normal wear!*



Piston and rod assembly from a 21½ x 27½ HAMILTON DIESEL

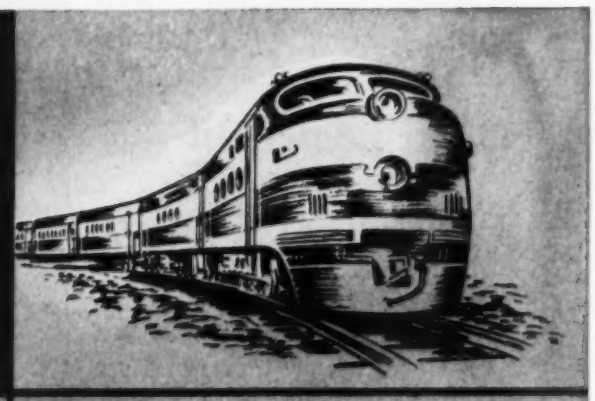
Hamilton Division • Hamilton, Ohio

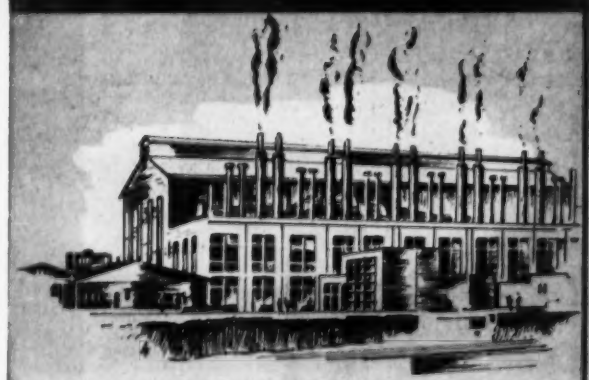
BALDWIN - LIMA - HAMILTON

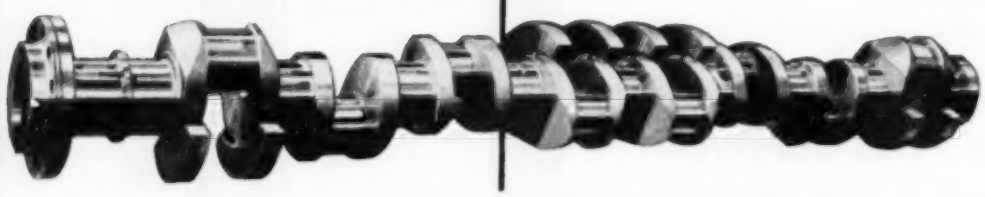
Dependable

Transmission of Power . . .

ERIE FORGE Diesel Crankshafts!

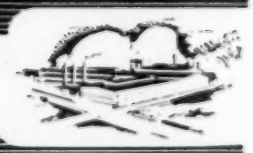


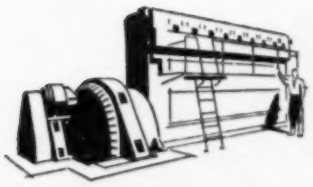




Here's the "Giant in the Diesel" . . . transmitting power that drives the modern railroad engines, pushes huge ships speedily and surely through the waves, or runs the power plants of business and industry. Erie Forge crankshafts are produced — from pouring of ingot to finished product — in our own plant. Every step is under the complete control of experienced craftsmen . . . one control, one responsibility. At Erie Forge you get the full benefit of our know-how and experience in the production of highest quality crankshafts — of exactly the right material to meet the most rigid requirements. Consult with Erie Forge on your next shafting requirements.

ERIE FORGE & STEEL CORPORATION
ERIE, PENNSYLVANIA





"Cured... bearing failure in their diesel-driven, front-end loaders"

A large fire-brick manufacturing company in the Philadelphia area had the problem of premature bearing failure in its diesel-driven loaders and shovel.

Headlights on even in daylight...

Sinclair Lubrication Engineer Harry Donovan reports, "These units were operating around the clock under conditions *so dusty that headlights were required.* Crankcases had to be drained and flushed bi-weekly! My first recommendation was closer adherence to an air filter maintenance program."

Drain intervals doubled!

Mr. Donovan continues, "Further observation proved to me that excessive idling and overloading were all contributing factors to a severe sludge condition. I recommended Sinclair SUPER TENOL® – explaining that the superior quality of the base oil plus the Sinclair formulated additives would extend bearing life *while at the same time removing accumulated lacquer and sludge.* A trial period proved SUPER TENOL doubled drain intervals and eliminated flushing entirely. This company now uses Sinclair SUPER TENOL exclusively."

Why not give a Sinclair Lubrication Engineer the chance to solve *your* lubrication problems? *There's no obligation.* Contact your local Sinclair office or write Sinclair Refining Company, 600 Fifth Avenue, New York 20, N. Y.

SINCLAIR LUBRICANTS

. . . and I can remember when that same boat would crawl up river at a snail's pace. The difference, I hear, is something called Re-Powered with O-P."

Yes, there are those boats that you wouldn't recognize, from performance, as the same. They have been re-powered with the newest in marine diesel power—the new Fairbanks-Morse Opposed-Piston engine in the 225 to 750 horsepower class.

Designed specifically to give you more performance than the engine it replaces, the new O-P puts more power . . . more speed . . . at your command. It is a completely "packaged" power unit with all accessories and piping engine mounted—can be installed for about ⅓ the fitting cost of a comparable engine.

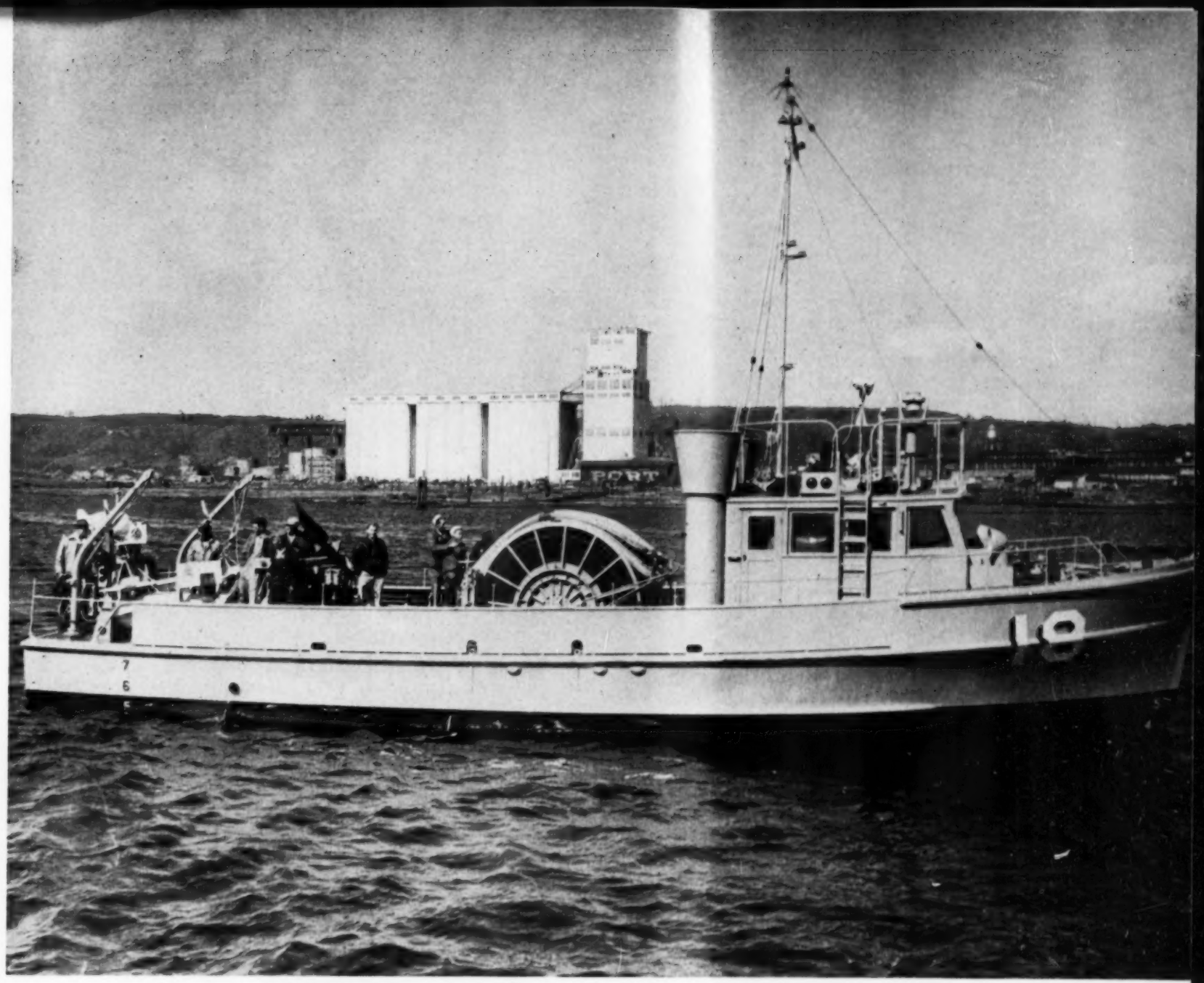
Why not find out how you can handle a larger tow—and at a higher speed, with this newest of work boat power. Ask your nearby F-M Marine Specialist for the complete story on performance, lower maintenance, greater reliability and economy. Call him today . . . before your next trip upstream. Fairbanks, Morse & Co., Chicago 5, Illinois.

FAIRBANKS-MORSE

a name worth remembering when you want the best

DIESEL AND DUAL FUEL ENGINES • DIESEL LOCOMOTIVES • RAIL CARS • ELECTRICAL MACHINERY
PUMPS • SCALES • HOME WATER SERVICE EQUIPMENT • FARM MACHINERY • MAGNETOS

Model 38F Marine O-P Diesel for the 225 to 750 horsepower class.



The *MSB 18*, one of the small, specialized minesweepers being built for the U. S. Navy. It is powered by two lightweight 300 hp. Packard diesels and features four Boeing gas turbines, each with a maximum output of 175 hp., for ship's service and minesweeping gear. The large stacks just aft of the pilot house are the gas turbine exhausts.

GAS TURBINES ARE HERE!

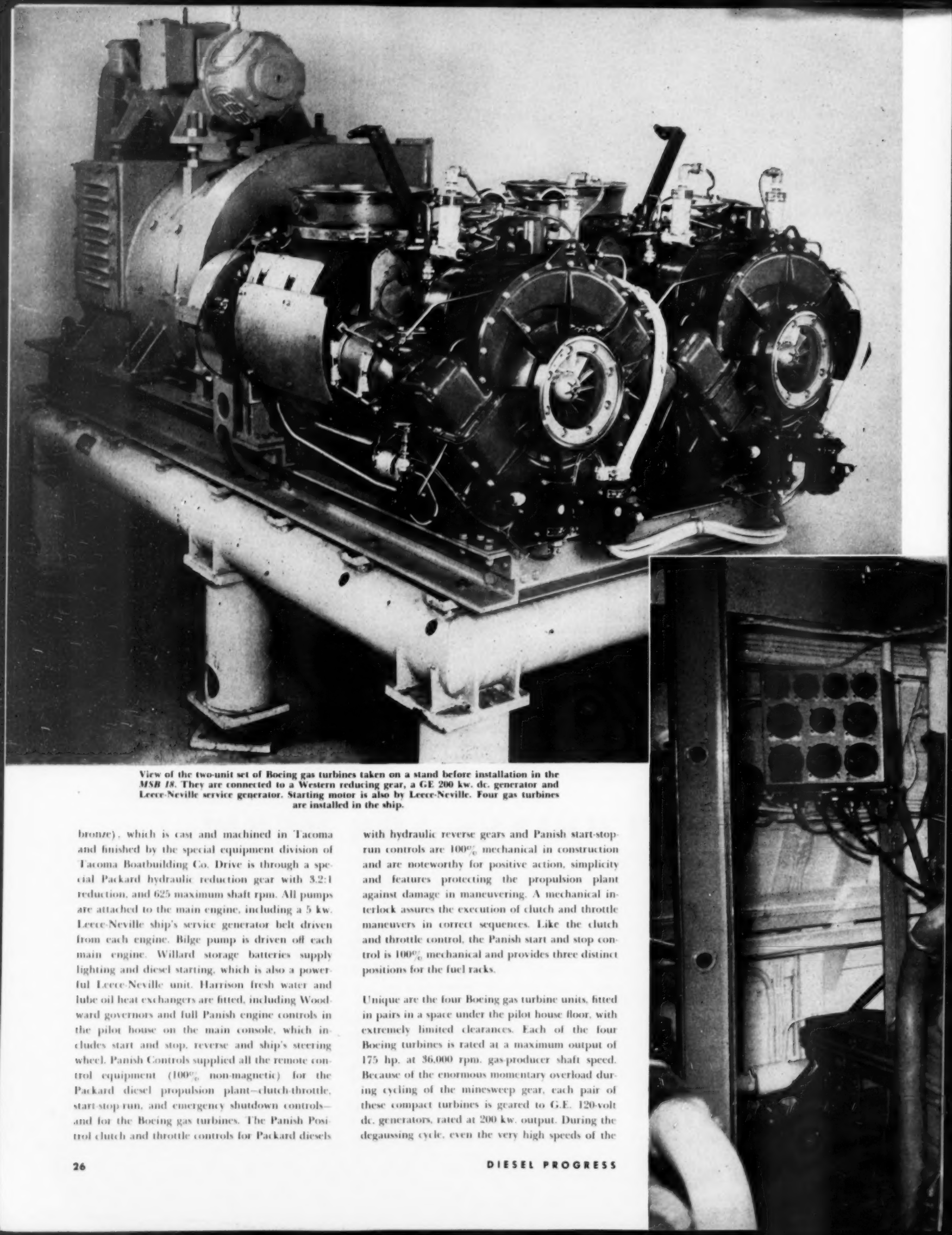
By CHARLES F. A. MANN

THIRD and smallest in the Navy's new series of highly specialized minesweepers is the MSB series which are rapidly nearing completion. Designed expressly as day boats, with little more accommodation than a small coffee and lunchroom, and minimum plumbing, these husky wooden hulled ships are designed to work in shallow waters and maneuver flexibly in harbors and tight places where the deep-sea sweepers cannot reach.

The latest to be completed on the Pacific Coast was the group under contract at Tacoma Boatbuilding Co., Tacoma, Wash., successful builders of the AMS type reported in the April issue of DIESEL PROGRESS. They are presently starting work on the large AM class of ships, thus making this yard one of the few in the United States with a record of building all three classes of minesweepers. The primary feature of the entire hull and machinery layout of the MSB type minesweeper is that they are about 97% non-magnetic, with costly alloy metals used throughout, leaving only certain parts of the diesel engines and the motor generator magnets as about the only ferrous metals on the ship. Hulls are of laminated bent oak framing and planking of Douglas fir and oak and the widest possible use of thick waterproof Douglas fir plywood throughout all the rest of the ship. With stores and midget "galley" below, forward, followed by pilot house with full machinery sweep gear controls next aft atop the minesweeper generator space, followed by the main power plant, tanks and stores space aft, they are laid out like a cruiser—even to the square stern.

Principal dimensions are: Length, overall, 57 ft. 3 in. Beam, maximum, 15 ft. 10 in. Draft, fully loaded, 5 ft. Displacement, 42 tons. Water, 20 gallons. Fuel oil, 1873 gallons.

The propulsion plant consists of a pair of identical 6-cylinder, lightweight, non-magnetic Packard diesels, developing 300 hp. each at 2000 rpm. They drive a pair of 44 in. by 28 in. Columbian bronze propellers, through bronze shafting (aluminum



View of the two-unit set of Boeing gas turbines taken on a stand before installation in the *MSB 18*. They are connected to a Western reducing gear, a GE 200 kw. dc. generator and Leece-Neville service generator. Starting motor is also by Leece-Neville. Four gas turbines are installed in the ship.

bronze), which is cast and machined in Tacoma and finished by the special equipment division of Tacoma Boatbuilding Co. Drive is through a special Packard hydraulic reduction gear with 3.2:1 reduction, and 625 maximum shaft rpm. All pumps are attached to the main engine, including a 5 kw. Leece-Neville ship's service generator belt driven from each engine. Bilge pump is driven off each main engine. Willard storage batteries supply lighting and diesel starting, which is also a powerful Leece-Neville unit. Harrison fresh water and lube oil heat exchangers are fitted, including Woodward governors and full Panish engine controls in the pilot house on the main console, which includes start and stop, reverse and ship's steering wheel. Panish Controls supplied all the remote control equipment (100% non-magnetic) for the Packard diesel propulsion plant—clutch-throttle, start-stop-run, and emergency shutdown controls—and for the Boeing gas turbines. The Panish Positrol clutch and throttle controls for Packard diesels with hydraulic reverse gears and Panish start-stop-run controls are 100% mechanical in construction and are noteworthy for positive action, simplicity and features protecting the propulsion plant against damage in maneuvering. A mechanical interlock assures the execution of clutch and throttle maneuvers in correct sequences. Like the clutch and throttle control, the Panish start and stop control is 100% mechanical and provides three distinct positions for the fuel racks.

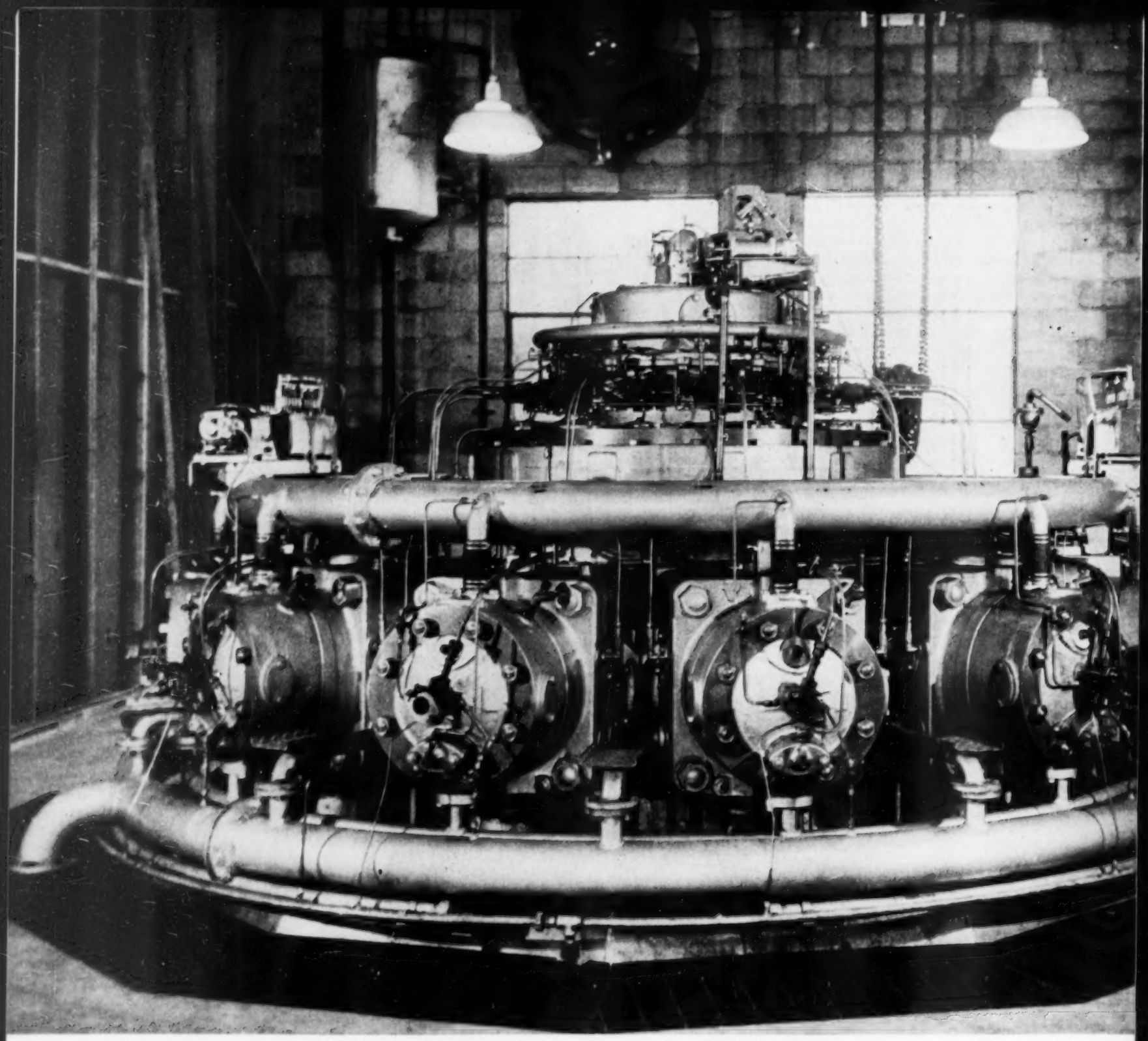
Unique are the four Boeing gas turbine units, fitted in pairs in a space under the pilot house floor, with extremely limited clearances. Each of the four Boeing turbines is rated at a maximum output of 175 hp. at 36,000 rpm. gas-producer shaft speed. Because of the enormous momentary overload during cycling of the minesweep gear, each pair of these compact turbines is geared to G.E. 120-volt dc. generators, rated at 200 kw. output. During the degaussing cycle, even the very high speeds of the

rotating components of the driven member of the turbines, plus the rotating generator rotor drag down to a crawl before picking up full speed. Even this is useful, because heavy flywheels to give sufficient inertia to carry the generator past the momentary peak are entirely eliminated and though fuel consumption is higher than diesel engines, the need of weight reduction and compactness offsets everything else. Each pair of Boeing turbines also drives a 10 kw. G.E. 120-volt ship's service standby auxiliary generator. Western Gear Works combining and reduction gear units are fitted on each pair of turbines and generator, together with a small Harrison oil cooling heat exchanger. Starting is by Delco electric motor and full Panish controls to the pilot house directly overhead are fitted.

An Arma gyro-stabilizer and compass is installed to smooth out sharp movement in rough water with the cable stretched out aft. A New England Trawler Equipment Co. minesweeping cable reel and 3-drum minesweeping winch is fitted, and Tacoma Boatbuilding Co.'s own manganese bronze rudder and skegs are fitted also. Syntron shaft seals with Goodrich Cutless stern bearings are supplied. A Vickers 400-cycle MG set and controls is operated off the auxiliary electric circuit. All ships of this class were commissioned at Tacoma Naval Station and work was done under the supervision of Capt. Linton Herndon, supervisor of ships of the 13th Naval District at Seattle, with Commander Laurance McKinlay, resident supervisor at Tacoma.

The pilot house and control console of the *MSB 18* with Panish controls on top and side for all engines. Panish Positrols with clutch and throttle interlock are side by side group mounted. Right aft of these are two emergency engine shutdown controls and below and on each side of the steering wheel are Panish start-stop-run controls. To the left of the clutch-throttle controls are the knobs which operate the Panish speed-throttle controls for the Boeing gas turbines.

One of the two main propulsion Packard diesels on the *MSB 18*. They are each rated 300 hp. at 2000 rpm. Willard batteries are used for starting.



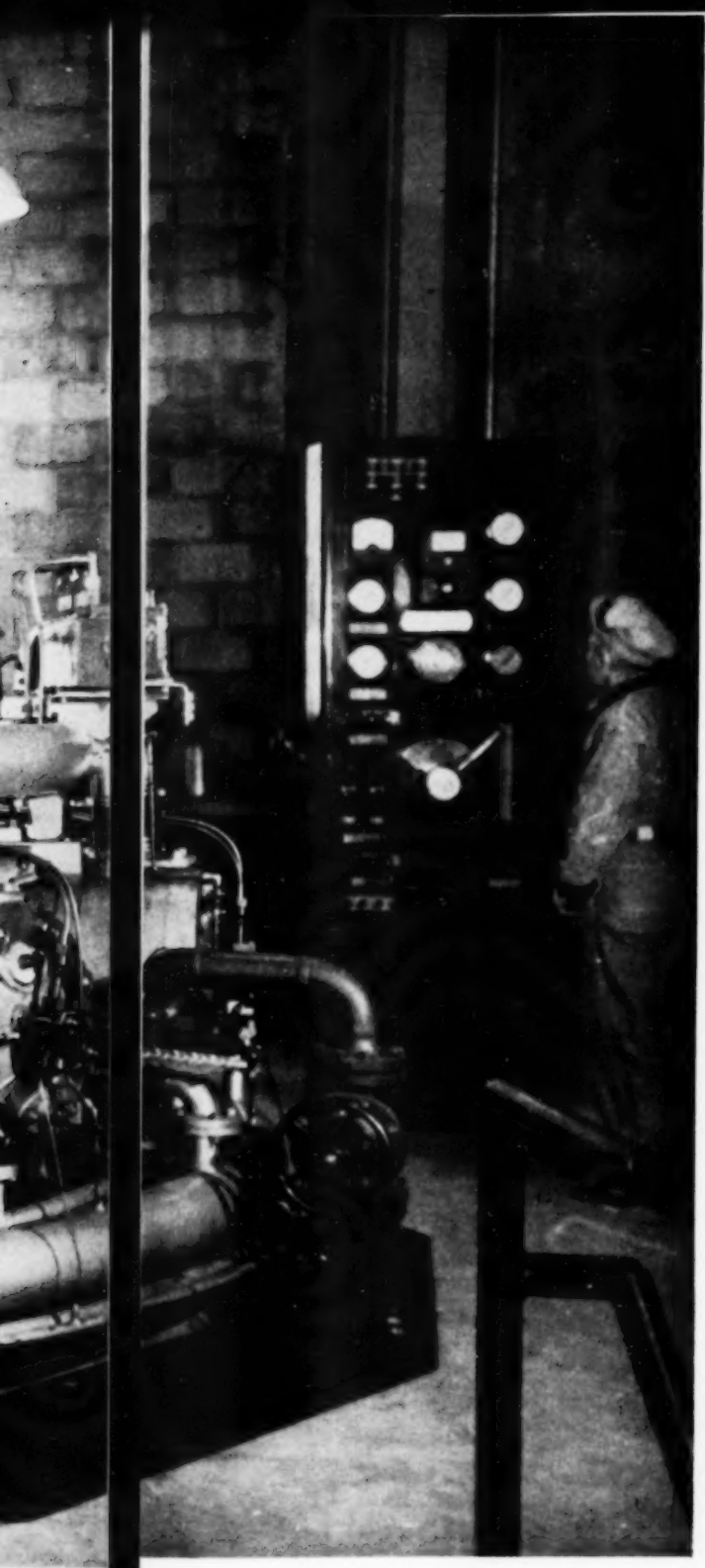
Installed for peak load and standby service only at the St. Ignace plant, this 12 cylinder Nordberg radial diesel engine is now serving more as a base load unit. It is rated 2025 hp., 1440 kw. and was placed in operation in March, 1953.

DIESELS SERVE MICHIGAN UTILITY

By DOUGLAS SHEARING

LUMBERING, farming, transportation and summer tourists vie for supremacy on the eastern end of the Michigan peninsula. The area boasts of its fine fishing and hunting yet supports paper making, leather processing, lumbering and farming. Sault Ste. Marie, site of the American and Canadian locks between Lake Superior and Lake Huron, is the leading community in the area. Through these locks passes an endless stream of boats carrying iron ore from the Mesabi range to eastern refining centers. The Soo Line Railroad has a terminal here and this, together with a leather processing plant, contributes to the community's activity. Yet the souvenir and curio shops, together with the tourist hotels open only during the tourist season, unmistakably indicate the vacation influence.

In an area roughly forming a triangle between Sault Ste. Marie, Manistique, and St. Ignace, the Edison Sault Electric Co. supplies the electrical



Edison Sault Electric Co. Teams Diesels With Hydro, Steam Generating Facilities to Meet Demands.

needs for both work and play. Demands for service are extremely variable due primarily to the influx of tourists during the summer months. For example, the use of electricity on Mackinac Island is greatest in the summertime with a demand of about 800 kw., while during the winter it drops to one quarter of this value. At St. Ignace, on the north shore of the Mackinac Straits, the fluctuation is not so pronounced due to the all-year operation of ferries across the straits and the railroad, truck and auto traffic between north and south Michigan at this point. St. Ignace also shows the summer-tourist influence in its restaurants, hotels, novelty shops and boat docks. Hydro, steam and diesel generating facilities team up to meet these unpredictable electrical demands, Fig. 3. The bulk of the power distributed by the Edison Sault Electric Co. is purchased from the U. S. Army Engineers and is generated in a hydro-electric plant operated by the Army in connection with the locks at Sault Ste. Marie. The firm capacity available from this source is 16,000 kw. on demand when needed.

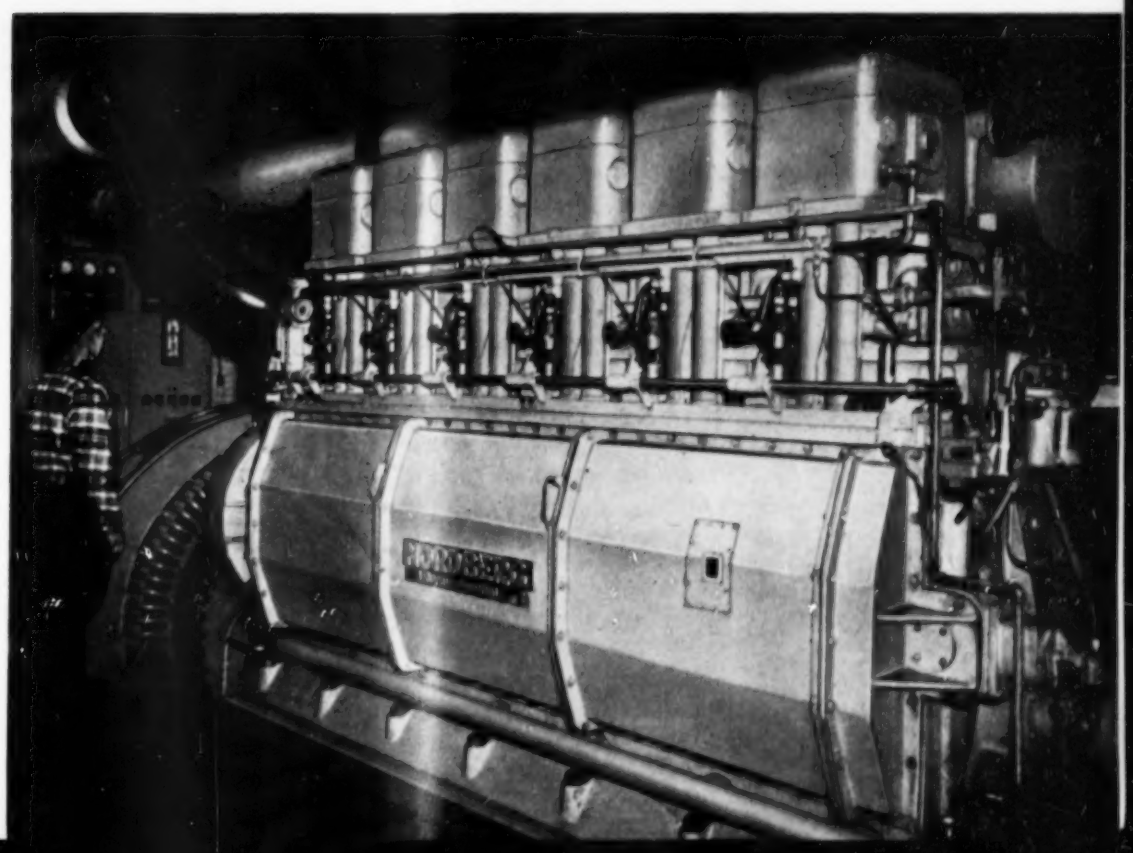
Variations in the quantity of electrical energy available from the hydro-electric plant utilizing the difference in head between Lake Superior and Lake Huron is due primarily to changes in available head and not to changes in available flow. As a consequence, the generating capacity used to supplement the available hydro power must be capable of handling both short-time peaks due to daily load fluctuations and sustained demands for power when hydro capacity is reduced through a decrease in available head. A typical system load curve, Fig. 1, shows how the diesel and steam generating equipment functions to handle peak loads on the system. A steam plant with capacity limited to 2000 kw. by available boilers, owned and operated by the company at Sault Ste. Marie, is used for peaking and supplementing the hydro power available.

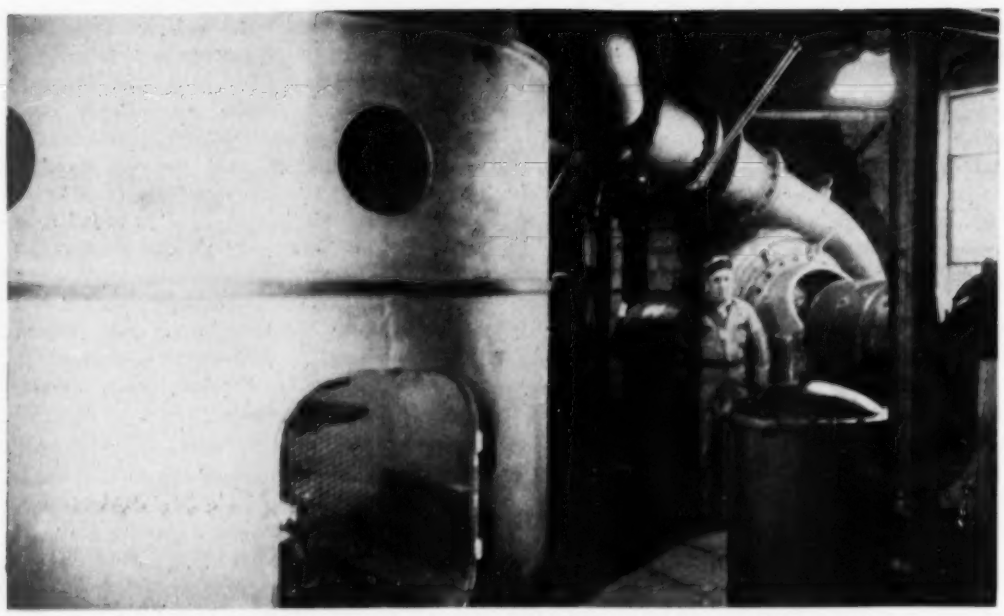
Diesel prime movers are installed at St. Ignace and on Mackinac Island where they assure reliability of power supply in that area as well as provide peaking and supplemental supply for the system. The daily load curve for Nov. 10, 1953, Fig. 2 shows how these two plants provide service in the area during a 12-hour period. The advantage of the diesel plant on Mackinac Island was demonstrated in December, 1953. Damage to the 6600-volt submarine cable from St. Ignace to Mackinac Island disrupted the normal source of electricity for the island. During the 8-day period the cable was out of commission, between Dec. 12 and Dec. 20, 1953, electricity for the island was provided by a Nordberg Supairthermal diesel unit that had been installed in the Mackinac Island plant and placed in operation about a month before the cable break occurred. The Mackinac Island plant contains, in addition to the Nordberg, three units totalling 576 kw. which were purchased second hand some years ago. Because these units were second hand it had been decided to supplement them with modern diesel equipment. The unit selected was a 1200-hp. Nordberg 4-cycle Supairthermal engine burning fuel oil and driving a 840 kw. generator at 450 rpm.

Studies of the system requirements for additional generating capacity had shown that the St. Ignace-Mackinac Island area needed assistance. Diesel standby capacity was available in the Manistique area under contract. As a result of this study, an addition was also made to the diesel plant at St. Ignace and a Nordberg radial diesel engine generating unit of 1440 kw. capacity installed. This 12-cylinder, 14 by 16, 2-stroke cycle, engine developing 2025 bhp. at 400 rpm., together with Elliott generator and exciter was placed in operation in March, 1953. It was the original intention to use this unit at St. Ignace for peak load and standby service only. But the best laid plans often go astray, and the St. Ignace installation was no exception. As month followed month, this "peaking" installation has been used more and more as a base-load plant. As of Feb. 1, this radial unit had operated 2100 hours or 29% of the total time since its initial start, generating 1,353,600 kwh. During the first 23 days of February, the unit operated 137.5 hours or 24% of the time.

Prior to the installation of the Nordberg radial engine, the plant at St. Ignace contained 1500 kw. installed capacity in six units ranging from 60 to 500

1200 hp. Nordberg four-cycle Supairthermal diesel at Mackinac Island plant of Edison Sault Electric Co. Had this unit not been available for service when the submarine cable serving the island was damaged in late 1953, it is doubtful that regular service could have been maintained.





Engine subbase on lower operating level in the St. Ignace plant houses Elliott generator and exciter. Roots-Connersville scavenging air blower is shown at right.

Fig. 1

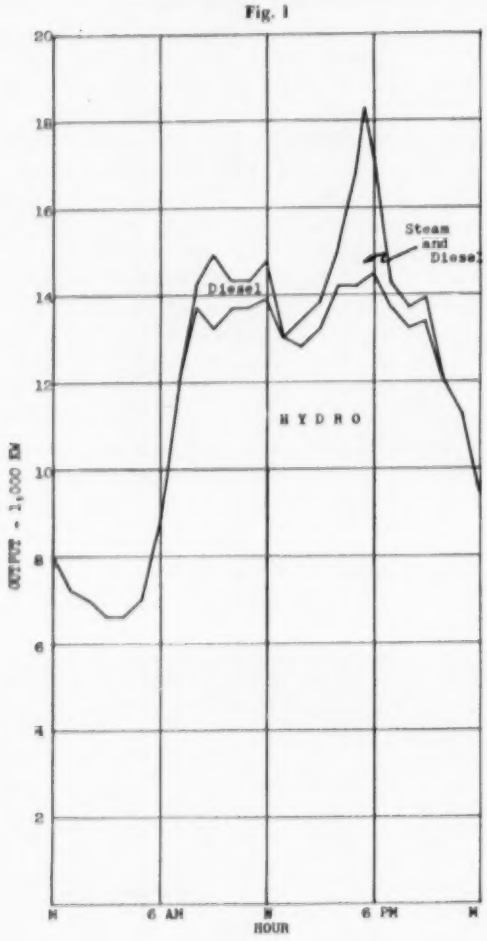


Fig. 2

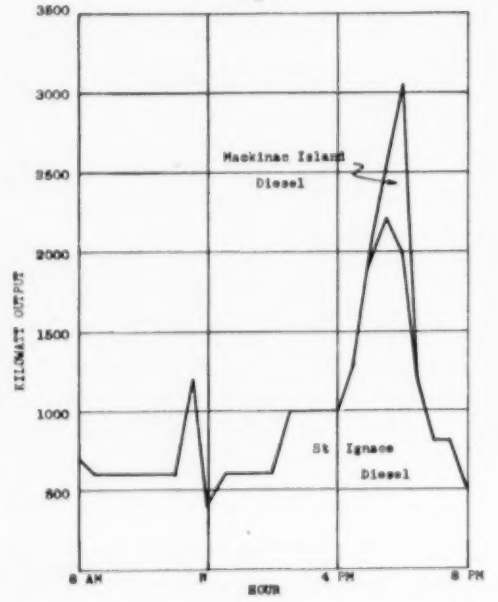
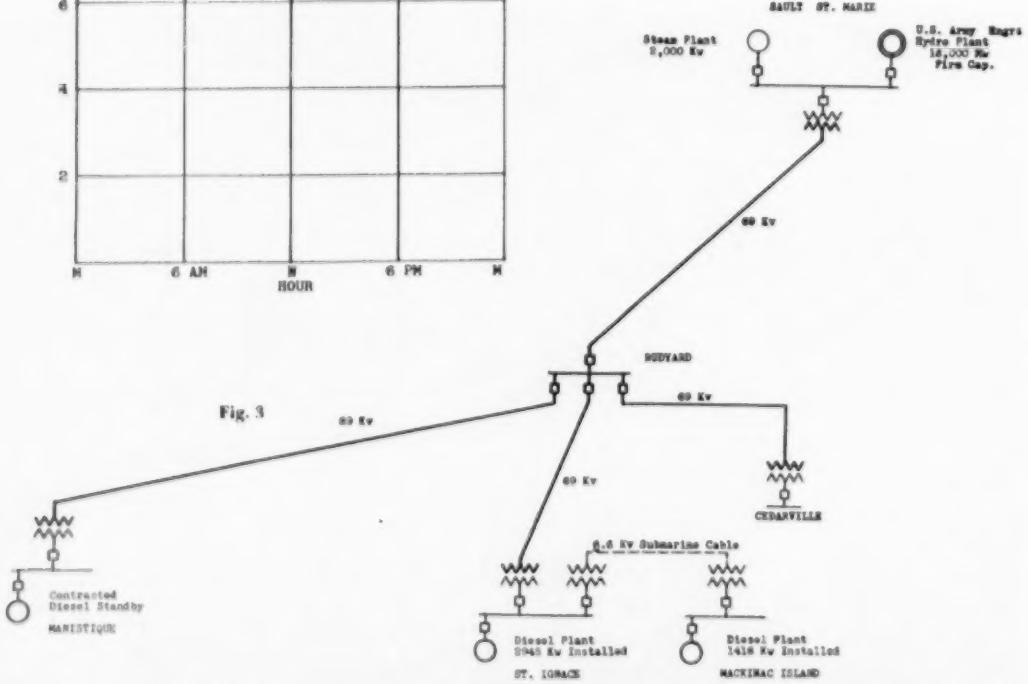


Fig. 3

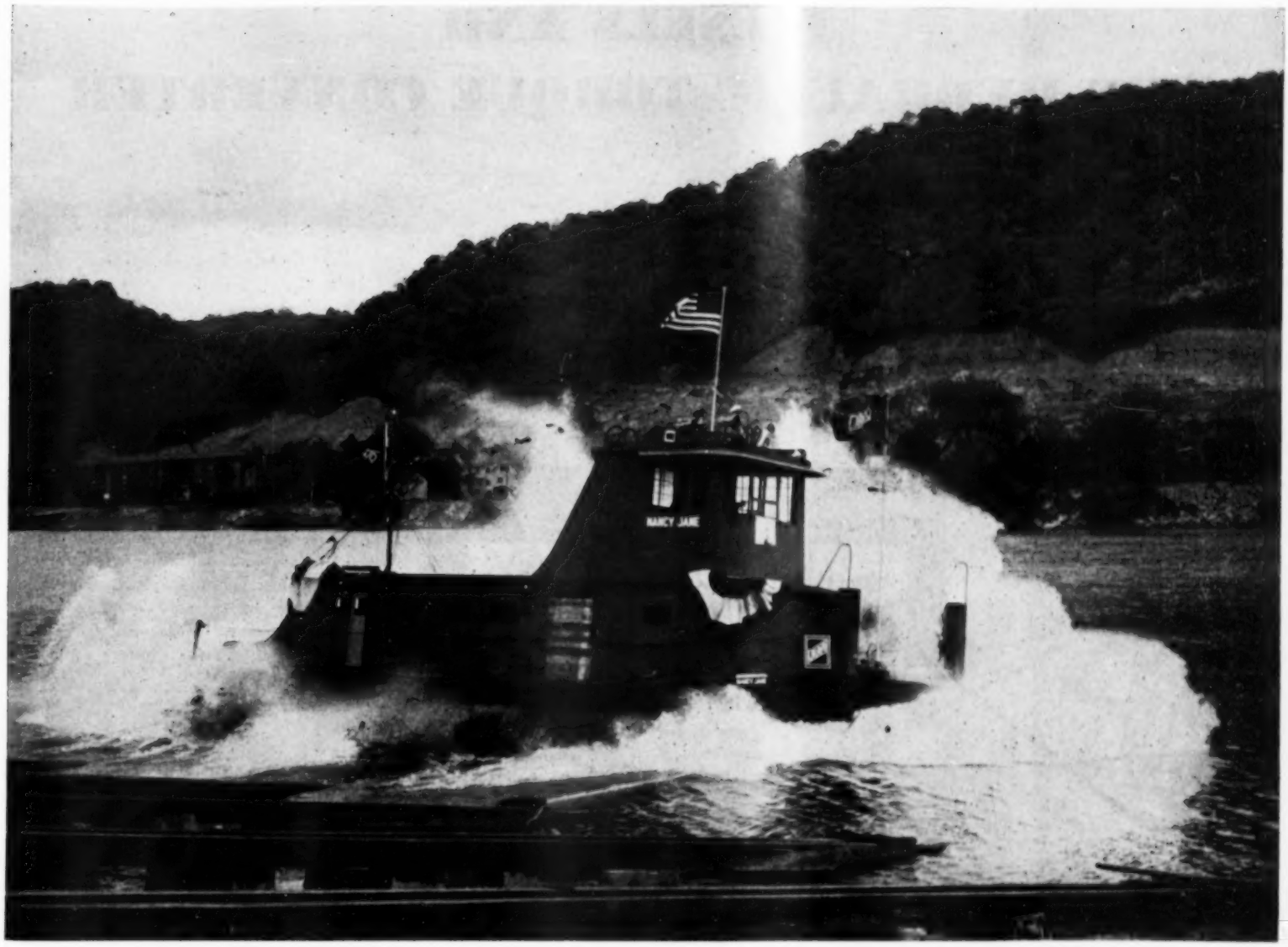


kw. each. These consisted of three 2-cycle, mechanical injection diesel engines driving generators with a combined capacity of 360 kw. and installed in 1922; a Busch-Sulzer 4-cycle, air-injection diesel driving a 160 kw. generator; and two Busch-Sulzer 2-cycle, air-injection diesels each driving a 500 kw. generator. These 500 kw. units are used regularly in operation together with the 1440 kw. Nordberg radial to supplement the system's main hydro supply. The new Nordberg radial engine-generator unit is installed in an addition to the St. Ignace power plant building. Generator and exciter are on the ground floor and the engine proper is located on the second floor. Since this unit was originally planned for intermittent service, an electric strip heater was installed in bottom of the steel support for generator and engine to eliminate possibility of moisture damage to generator windings.

Engine cooling is accomplished by pumping water from Lake Huron through the shell-and-tube lubricating-oil and jacket-water coolers. A thermostatic-controlled by-pass valve on the jacket water regulates the temperature of the water to the engine. A single jacket-water pump circulates water through closed jacket-cooling system. The 200 hp. scavenging blower motor is connected directly to the generator terminals. On starting up the unit the Nicad station battery provides full field on the generator exciter. When the generator voltage builds up to a predetermined point, the exciter field is disconnected from the battery and reconnected for shunt operation by relays. This method for starting the blower motor has proved very successful. All engine auxiliaries including fuel and lubricating-oil pumps, lubricating-oil tank, fuel-oil filters and pumps and starting-air tank and compressor are located on the ground floor. Lubricating oil from the engine is passed through a Winslow full-flow filter and a magnetic separator before returning under pressure to the lubricating system in the unit. Fuel for both the St. Ignace and Mackinac Island plants is a 30 API gravity product obtained from Michigan refineries. Fuel cost at the St. Ignace plant averaged 10.73¢ per gallon during the 6-month period from August, 1953, through January, 1954.

List of Equipment

Diesel engine—Nordberg.
Generator—Elliott.
Exciter—Elliott.
Governor—Marquette.
Scavenging blower—Roots-Connersville.
Exhaust muffler—Maxim.
Intake-air filter—American Air Filter.
Jacket-water cooler—Ross.
Lubricators—Manzel.
Lubricating-oil cooler—Ross.
Jacket-water pump—Allis-Chalmers.
Raw-water pump—Allis-Chalmers.
Lubricating-oil filter—Winslow.
Lubricating-oil pumps—DeLaval.
Fuel-oil filter—Nugent.
Fuel-oil transfer pump—Blackmer.
Fuel-oil booster pump—Roper.
Starting-air compressor—Gardner-Denver.
Station battery—Nicad.



FIRST OF "SWITCHER" TYPE TOWBOATS HITS THE WATER

THE first of five new 70-ft. Ram class "switcher" towboats joined the nation's growing fleet of inland waterways vessels with the recent launching of the *Nancy Jane* at the Dravo Corp. shipyard near Pittsburgh, Pa. As it slid into the Ohio River the dieselized workboat was christened by Miss Nancy Jane Campbell, daughter of Thomas L. Campbell, operator of Campbell Barge Line. The *Nancy Jane* was built for the Campbell Line.

Four other identical towboats are under construction on Dravo's shipyard assembly line. They are specials—designed to switch barges around in making up tows, much like switch engines do in freight yards. Although of less horsepower than the boats which push heavy tows along the rivers, the vessels have many big-boat features. They are designed mainly for towing sand and gravel and coal barges, for shuttling cargo barges between terminals in inland waterways harbors and for marine construction work. One of their jobs will be to relieve larger, long-range towboats from the time-consuming task of collecting and delivering individual barges at various docks and terminals after the larger, long-range towboats have completed their run with their string of barges.

Despite their size, the Ram class vessels pack considerable barge-pushing power in their twin Atlas 35 diesel engines, built by National Supply Co., which have a combined rated output of 580 hp. The Atlas 35 is National Supply's newest diesel. The 4-ft. 3-in. diameter propellers are enclosed in Kort nozzles which provide additional pushing ability and maneuverability.

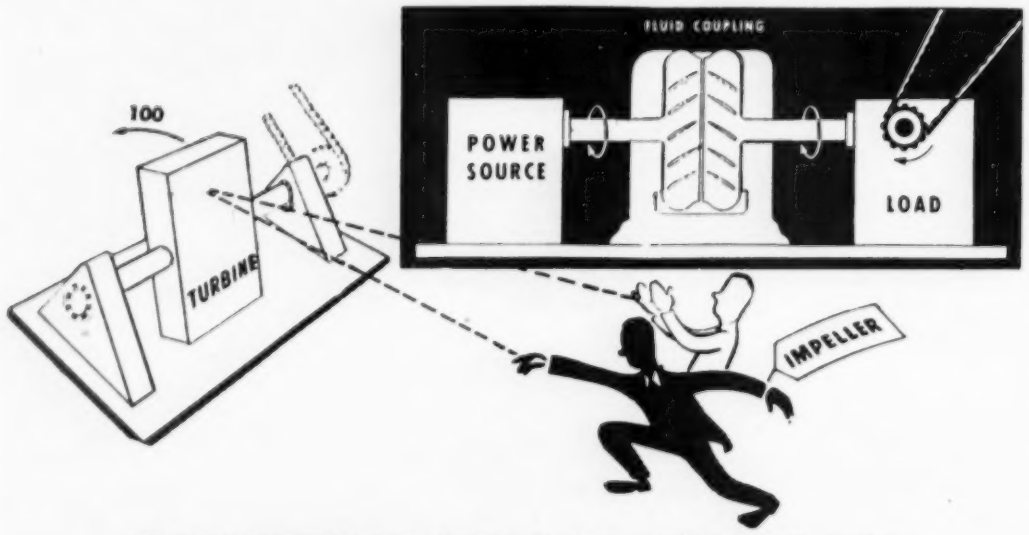
A unique feature is that the boat has no smokestacks. Exhaust from the diesels discharges through two small pipes installed flush with the aft wall of the pilothouse. Elimination of smokestacks gives the pilot better visibility astern. Quarters for the crew are compact but comfortable. Four staterooms and bath are located aft of the engine room and the galley and booth-type messroom are forward, directly below the pilothouse. All quarters are heated by forced hot air. Internal passageways provide access to all quarters.

Controls for the main engines are in the pilothouse, as on larger vessels. The boat also is equipped with reversing gears which permit reversal of direction without stopping the engines. Fuel oil tanks on the vessel have a capacity for 12 to 14 days of continuous operation. Drinking and cooking water is stored in a 2000-gallon tank. The towboats are 20 feet wide and 8 feet deep, designed to operate at a 6-ft. draft, and they are as quick as a cat.

DIESELS AND THE HYDRAULIC TORQUE CONVERTER

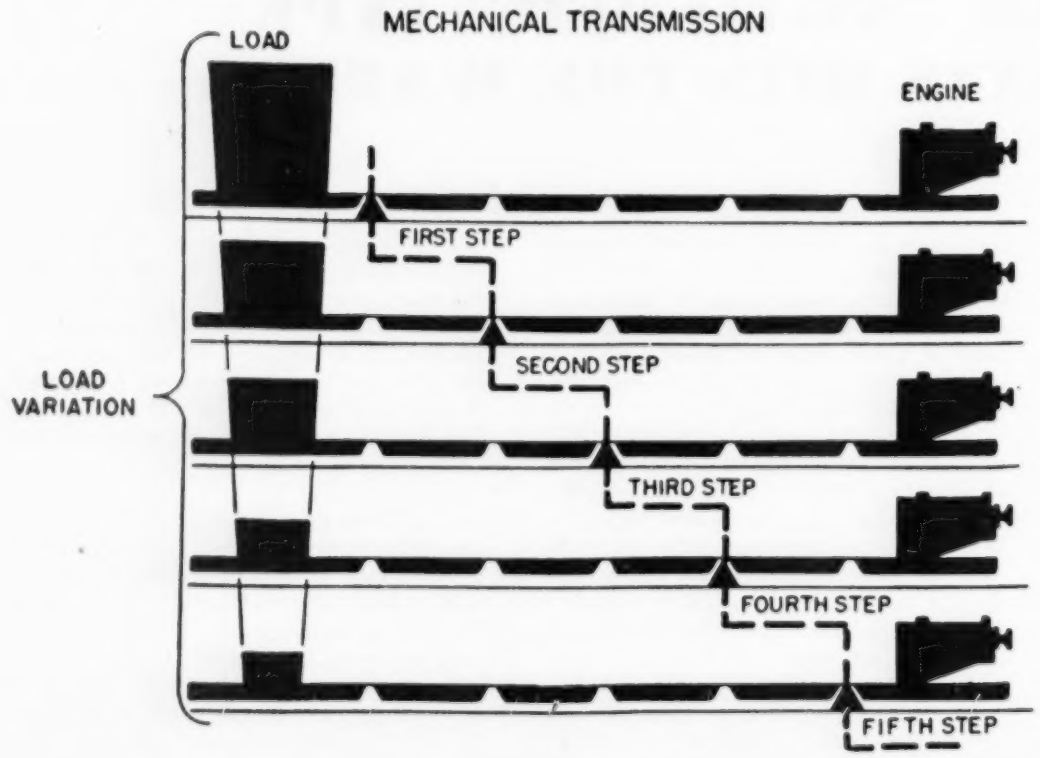
By BRUCE W. WADMAN

AS a means of power transmission for diesel-driven equipment, the hydraulic torque converter has found many applications in the diesel field. The hydraulic torque converter is not a recent development. Its principles of operation are quite old, but the engineering refinements required to make it efficient and commercially practical have required many years of intensive research, and not until 10 to 15 years ago did it appear that the field of application was large enough to permit large scale production.



A Twin Disc diagrammatic sketch illustrating what goes on inside a hydraulic coupling.

Mechanical step-gear transmission showing fixed fulcrum points, which are the various shift points. These shift points permit the driver to change the torque ratio between input torque and output torque to meet the "load variation." But each time the shift of fulcrum point is made, the power flow must be stopped by disengaging a clutch while the driver shifts gears.



Hydraulic torque converters should not be confused with the more common "fluid flywheel," "fluid couplings," or "fluid drives" available in certain automobiles. Both are forms of fluid drive, but the principles of power transmission are very different. The basic difference between the hydraulic coupling and the hydraulic torque converter is that the hydraulic coupling transmits input torque without change while the hydraulic torque converter can actually increase torque.

The torque converter consists basically of three members: a driving member, a driven member and a stationary or reaction member. The reaction member has a set of stationary blades that are required to permit the multiplying of torque. These members are enclosed in a housing which is filled with oil. The oil circulates in the converter going outward from the driving member to the driven member and then back toward the center but running through the stationary member. The blades of the members in the torque converter are curved, and when the oil hits the stationary member, it would tend to turn this member in the opposite direction. Since this member is fixed in place, however, the direction of the oil is changed before it returns to the driving member. In speaking of multiplying torque, it must be remembered that horsepower is a function of torque and speed. The horsepower output of an engine cannot be increased beyond its maximum rating; therefore, when a torque converter multiplies torque, it is at the sacrifice of output speed. In other words, a torque converter changes the torque output of an engine to a higher value at a lower speed or occasionally to a lower value at a higher speed.

Torque multiplication occurs in a converter because the oil hitting the stationary member provides a reaction torque which is added to the input torque, thus resulting in increased torque at the output shaft. The rotational speed of the driving member in comparison with the driven member determines the degree of torque multiplication in the converter. Whenever the load tends to pull the engine down, the driven member slows down and this causes the oil to strike the blades of the driven member at a sharper angle, thus adding reaction torque to the engine torque.

As the output speed, or the speed of the driven member, approaches stall, the oil strikes the blades at a sharper and sharper angle, until at stall the

The First in a Series of Articles Describing The Hydraulic Torque Converter and Its Use in The Diesel Industry

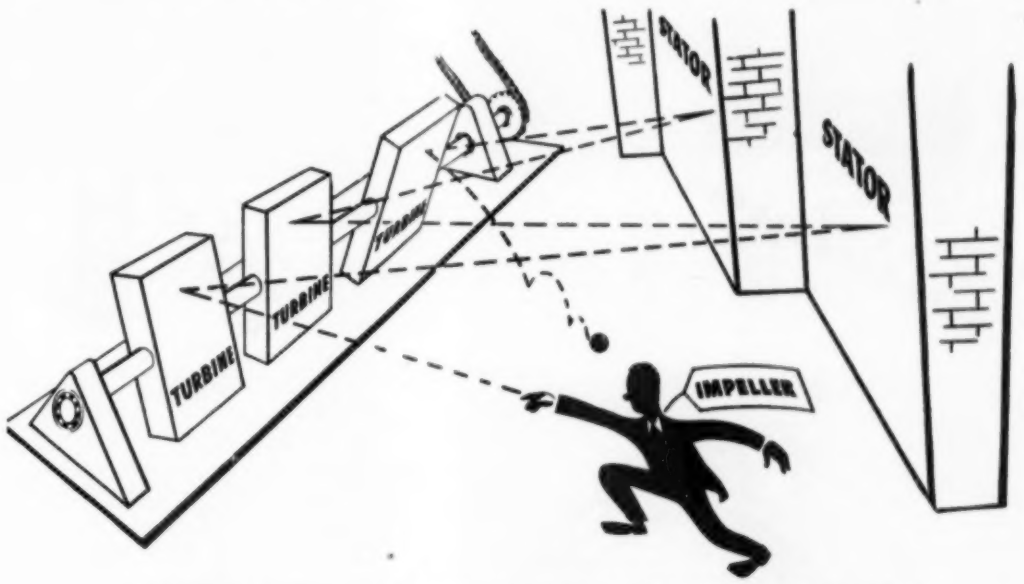
angle is at a maximum and torque multiplication is greatest. Conversely, as load resistance decreases, the driven member speed and the driving member speed approach each other, the oil strikes the driven member blades at a smaller and smaller angle and slips through easily, causing the input torque and output torque to approach equality. Through this reaction of the whirling oil among the driving, driven and reaction members the hydraulic torque converter automatically selects the proper output torque for any load. Torque converters presently in use deliver from 2 to 6.5 times engine torque with the output shaft stalled, the amount of torque multiplication depending upon the design and type of converter. The relative value of the reaction torque added to the input torque is dependent upon blade shapes and the angle at which the blades are set in the members.

A mechanical transmission performs the same function as the hydraulic torque converter and may be termed a mechanical torque converter, but the hydraulic torque converter is an automatic, infinitely variable torque ratio transmission which, within its designed range of operation, will immediately adjust the speed of the load to correspond to the resistance to moving the load. In other words, it automatically increases or decreases immediately the mechanical advantage as the load varies.

Because the hydraulic torque converter relies on fluid for power transmission and eliminates the steps in ratios which are provided by conventional transmissions, it offers the following advantages: 1. Provides fluid drive. 2. Absorbs shock loads. 3. Absorbs torsional vibration. 4. Prevents stalling of the engine and harmful engine lugging. 5. Provides a series of infinite variable ratios within the designed operating range of the converter. 6. Permits high output torque at low output rpm. 7. Provides variable output speed at consistent input speeds. 8. Permits partial throttle operation throughout the entire engine speed range. 9. The speed range of the engine is increased by the effective range of the converter, thus permitting use of smaller engines in some cases.

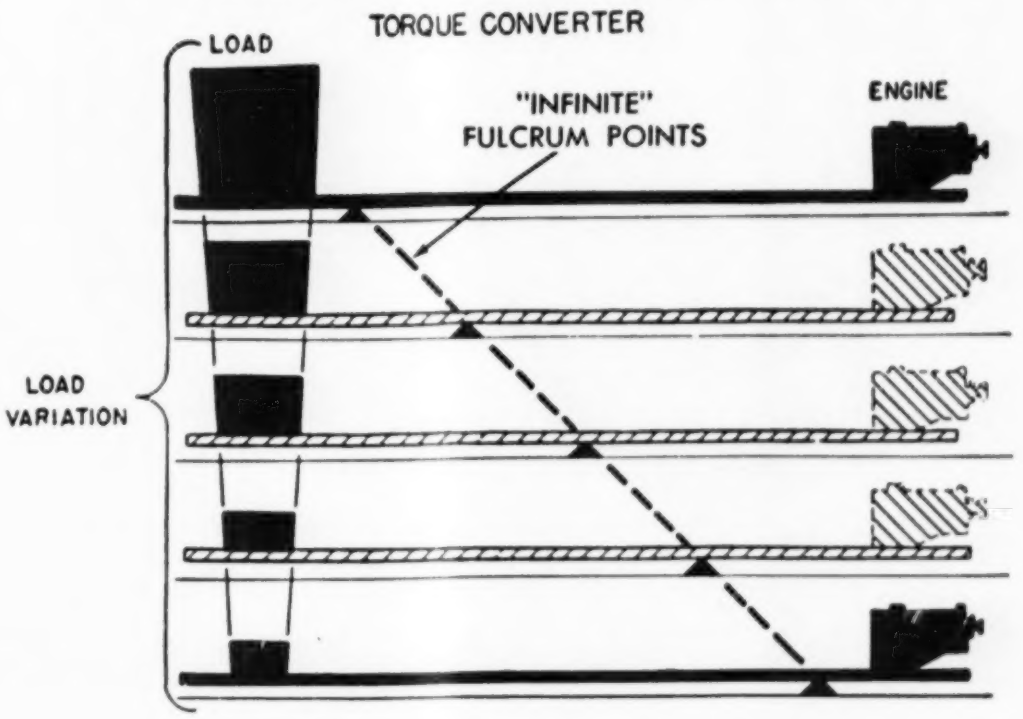
The hydraulic torque converter has found its greatest application up to the present on diesels where the equipment to be driven is started under load or has a widely varying or highly fluctuating load during operation. Also, the torque converter has found great use in installations where the load frequently exceeds the normal torque output of the power source. A few areas where hydraulic torque converters have been used successfully are: tractors, off-the-highway trucks and mobile equipment, shovels and draglines, oil-field drilling equipment, small locomotives and logging trucks. It can readily be seen how hydraulic torque converters lower maintenance costs caused by shock loadings in many of these applications by the absorbing power of fluid transmission.

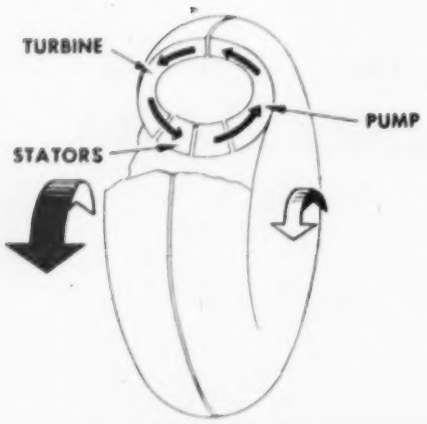
The development of the hydraulic torque con-



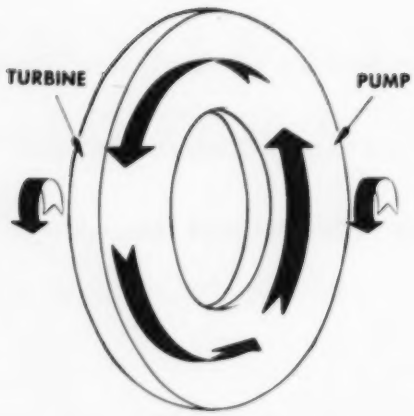
This Twin Disc diagrammatic sketch shows what goes on inside a 3-stage torque converter.

Allison torque converter showing "infinite" number of fulcrum points. With mechanical step-gear transmission there is only one point in each step at which the load and engine are in exact balance. Hydraulic torque converter provides an infinite number of fulcrum points which give the load and engine the exact point of balance at all times.



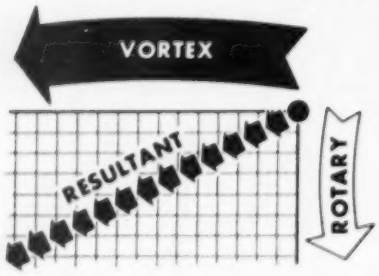


VORTEX FLOW

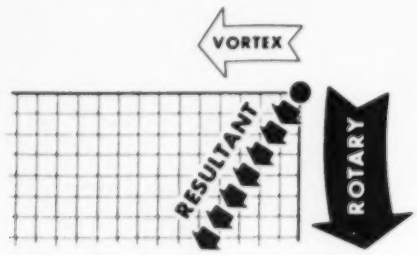


ROTARY FLOW

RESULTANT FLOW WHEN PUMP IS ROTATING MUCH FASTER THAN TURBINE



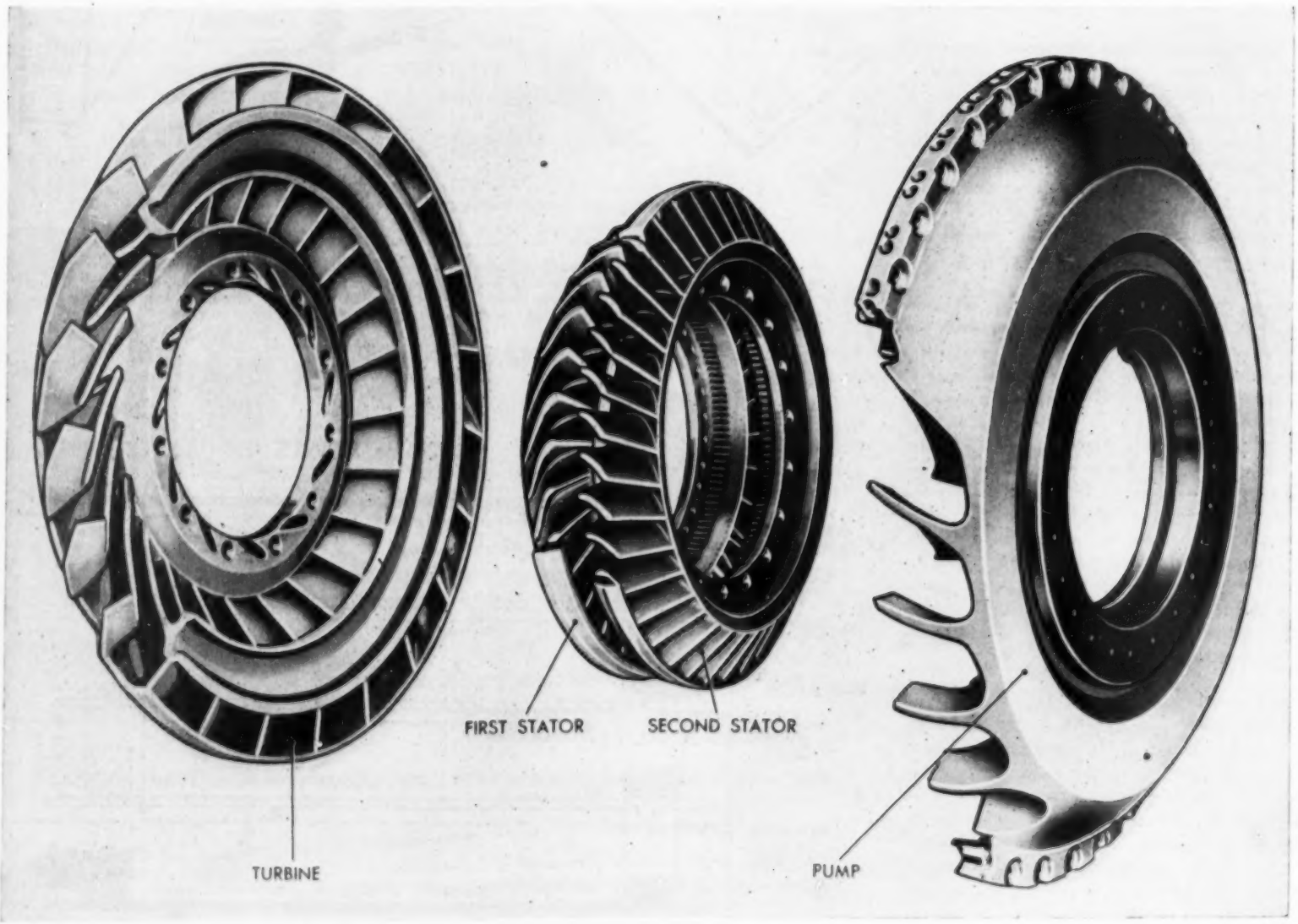
RESULTANT FLOW WHEN TURBINE SPEED APPROACHES SPEED OF PUMP



verter has reached the point where the different types of torque converters vary widely as to design. Performance characteristics vary widely also. Some units are designed to operate strictly as hydraulic torque converters at all times. Others are built as a combination hydraulic torque converter and hydraulic coupling, and still others incorporate a direct-drive clutch to secure highly efficient operation at high speeds. In the succeeding articles, two leading torque converters representing two distinct types of design will be described along with their actual field applications.

Rotary and vortex flow of oil within Allison torque converter. The instant the torque converter pump, driven by the engine flywheel, begins to rotate, the oil spins around with the pump. This movement of oil is called rotary flow. The turbine, connected to the load, resists turning. Because of this resistance, and because of the shape of the blades within the torque converter elements, the oil takes a second path of travel—crosswise—called vortex flow.

Allison torque converter elements partially cutaway illustrate how blades of torque converter members are curved to provide torque multiplication. The oil circulates outward in the driving member (the pump) and inward in the driven member (the turbine). The stator blades are curved as shown to redirect the vortex flow of oil so it enters the pump in the same direction the pump is turning to aid the pump and multiply torque.



TWIN DIESEL TOWBOAT "LUCY E"

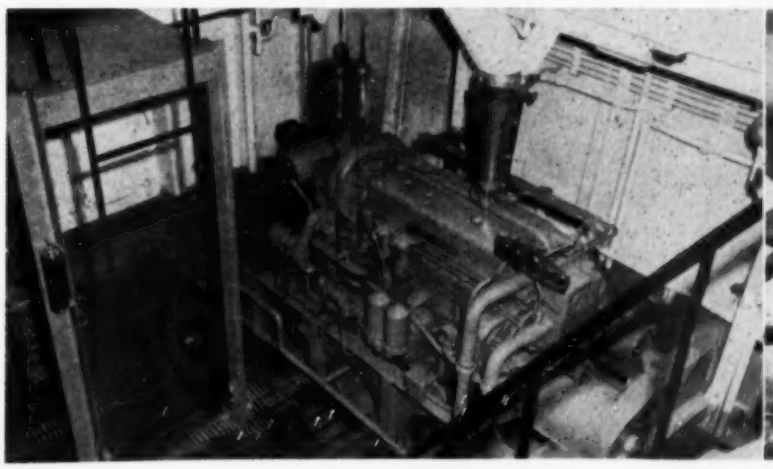
THE twin-screw towboat *Lucy E,* recently put to work at TVA's Colbert Steam Plant, is another in the long list of river boats built at the yards of St. Louis Shipbuilding & Steel Co. The *Lucy E,* built to give long, trouble-free service under rugged operating conditions, packs a lot of power in a relatively small hull.

With a 54-ft. over-all length, an 18-ft. molded beam and a design draft of 5 ft. 9 in., she is not particularly large. But with a total hull depth of 8 ft. 9 in., together with a ⅜-in. deck, side and bottom plating, the vessel is well suited to stand up under hard service. The 410 hp. with which the *Lucy E* goes about her duties is supplied by two General Motors model 62200 marine diesels; each develops 205 hp. at 1600 rpm., and each of the diesel engines is equipped to operate through a 4.5:1 ratio reduction and reverse gear.

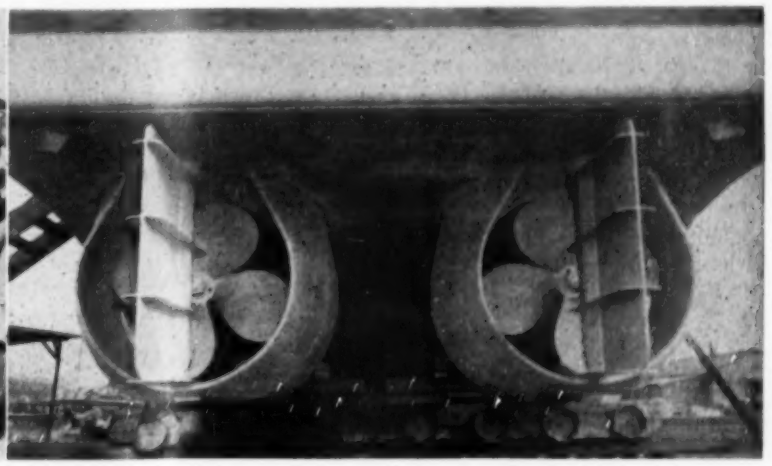
Electrical power is furnished by two diesel-driven generator sets, each 20 kw. 3/60/220-volt ac. Engine cooling is provided by a St. Louis Shipbuilding & Steel Co. closed, clear-water system in which engine cooling water is circulated through a series of ducts located along the side of the hull below the waterline. The installation is designed to give ample cooling capacity, even in the unlikely contingency that the surrounding river water might reach temperatures as high as 90°. This provides a generous margin of safety. An additional feature of the cooling system is the added structural strength the ducts convey to the sides of the hull. These, together with a heavy fender plate running longitudinally just below the gunwale, stiffen the hull.

The *Lucy E's* performance under working conditions has corroborated the builders' tests, which indicated a vessel of unusual maneuverability and efficiency. The towboat's propellers turn in specially designed Kort nozzles, which add considerably to the effective thrust. A St. Louis Shipbuilding & Steel Co. hydraulic-ram steering system is used. Two separate cylinders control the two steering rudders and the four flanking rudders, and are capable of moving them through a 90° arc in 17 seconds, even when the vessel is towing under full power. Hydraulic pressure is delivered to the steering cylinders by two motor-driven pumps, with provision made for either pump to operate both rams. Electrical-mechanical follow-up controls to the steering stand in the pilot house provide for the steering levers to be also rudder-indicators. Thus the pilot knows at all times the exact angle of both the steering and flanking rudders. The deckhouse space is limited because of the size of the boat, but there are ample quarters for two men, with complete galley and toilet facilities.

View in the engine room of the *Lucy E* showing one of the GM Detroit Division diesels which delivers 205 hp. at 1600 rpm.



The *Lucy E's* twin screws turn in these specially designed Kort nozzles, thus adding to the effectiveness of the thrust.



NAVY GETS 100-TON FLOATING DIESEL CRANES

By CHARLES F. A. MANN

COMPLETED at Seattle and in service at San Diego Naval Base and at Oakland Naval Supply Center are two of the largest floating cranes ever built in the United States. The two, known as YD-193 and YD-195, are diesel electric jobs featuring twin Union diesel engines. They are electrified throughout for all purposes including hoisting, turning and auxiliary machinery necessary to operate cranes of this large capacity. Rated at 100 tons, they easily performed at high speeds with test loads weighing 125 tons.

The fact that the initial starts of the Union diesels took place in 2½ seconds when cold created considerable enthusiasm at the builder's yard and the Seattle headquarters of the Bureau of Ships because the engines were just as they were received from the factory and had never been turned over since leaving the test stand over four months before. This shipboard experience confirmed the engine builder's test results. One of these engines was thoroughly chilled by the circulation of salt brine ice mixture to a temperature of 28°F. Even under those adverse conditions starting was veritably instantaneous with the cylinder firing whose piston first came up under compression. For the service for which floating cranes of this type are used, easy and prompt starts are essential.

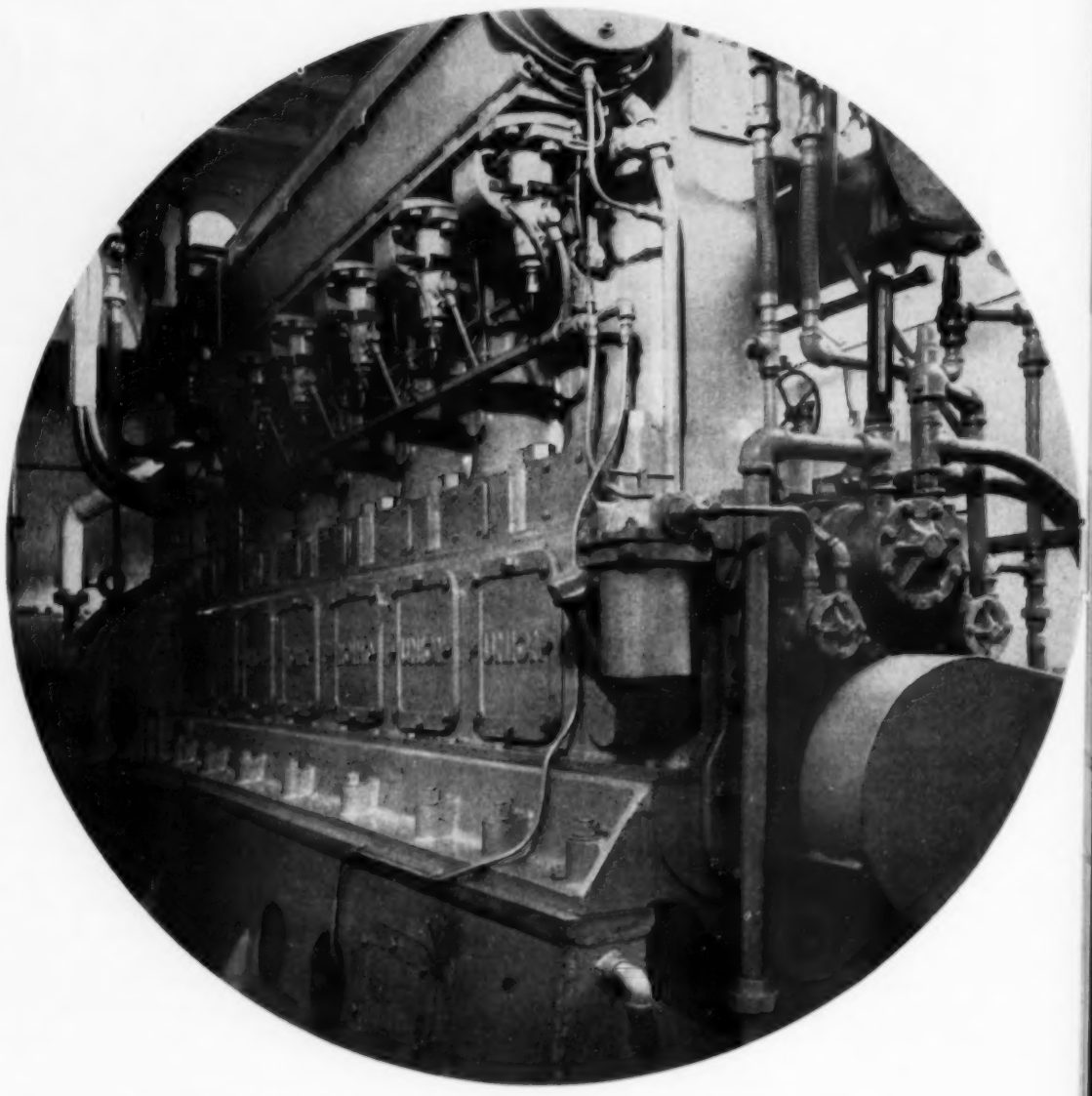
Built at the Seattle plant of Todd Shipyards Corp., the new cranes went into service this summer. Both left Seattle under private towing contracts.

The hulls are of welded steel construction with fixed ballast poured in certain sections to balance the tremendous loads of the actual lift and the rotating housing with its related machinery. These travel on a circular track of 36 ft. 8 in. diameter. Total rotating weight with the load is 930,000 lbs., including the hoist engine and the 375,000 lbs. counter-weight located at the rear of the cab. Additional loads will impose by adjustable factors incidental to varying lifts at different radii.

The hulls are 140 ft. long, 70 ft. beam and 18 ft. 6 in. total depth. The hoist blocks will reach down 25 ft. below the water level and the lift of the main hook above water is 60 ft. at 104 ft. 6 in. radius. The auxiliary hook will lift 78 ft. above water at 122 ft. 6 in. radius.

The main engine room is in the hull below the main deck level. It houses two model GA6 Union diesel stationary engines. Each has six cylinders, 8½ in. bore by 11 in. stroke and develops 225 hp. at 600 rpm., enough power for over 150 kw., but is conservatively rated 125 kw. Each is equipped with model UG8 Woodward governor and an Ideal generator rated at 52 amperes, 125 kw. at 240 volts, dc.; 120-volt lighting power is provided by a motor generator set. The main electric switchboard was made by Pelham Electric Manufacturing Co. A 2-cylinder Nordberg 20-hp. diesel driving a 10 kw. Kato generator supplies power for ships' service. It also provides power for starting air compressor.

In the cab, mounted on the circular track, is all of the rest of the machinery. It consists primarily of two hoisting engines and a boom hoist. The equipment was built jointly by Pacific Car & Foundry Co. and Washington Iron Works. Fabrication of the giant frame for the cab and its hoists is the largest of its type in the Pacific Northwest. These giant hoists comprise a main hoist with twin 51 in. by 99 in. cable drums powered by a 100 hp. Westinghouse dc. motor; an auxiliary hoist that can handle a 15-ton load at 122½ ft. radius is also powered with a 100 hp. electric motor through a single 36 in. by 89 in. drum.

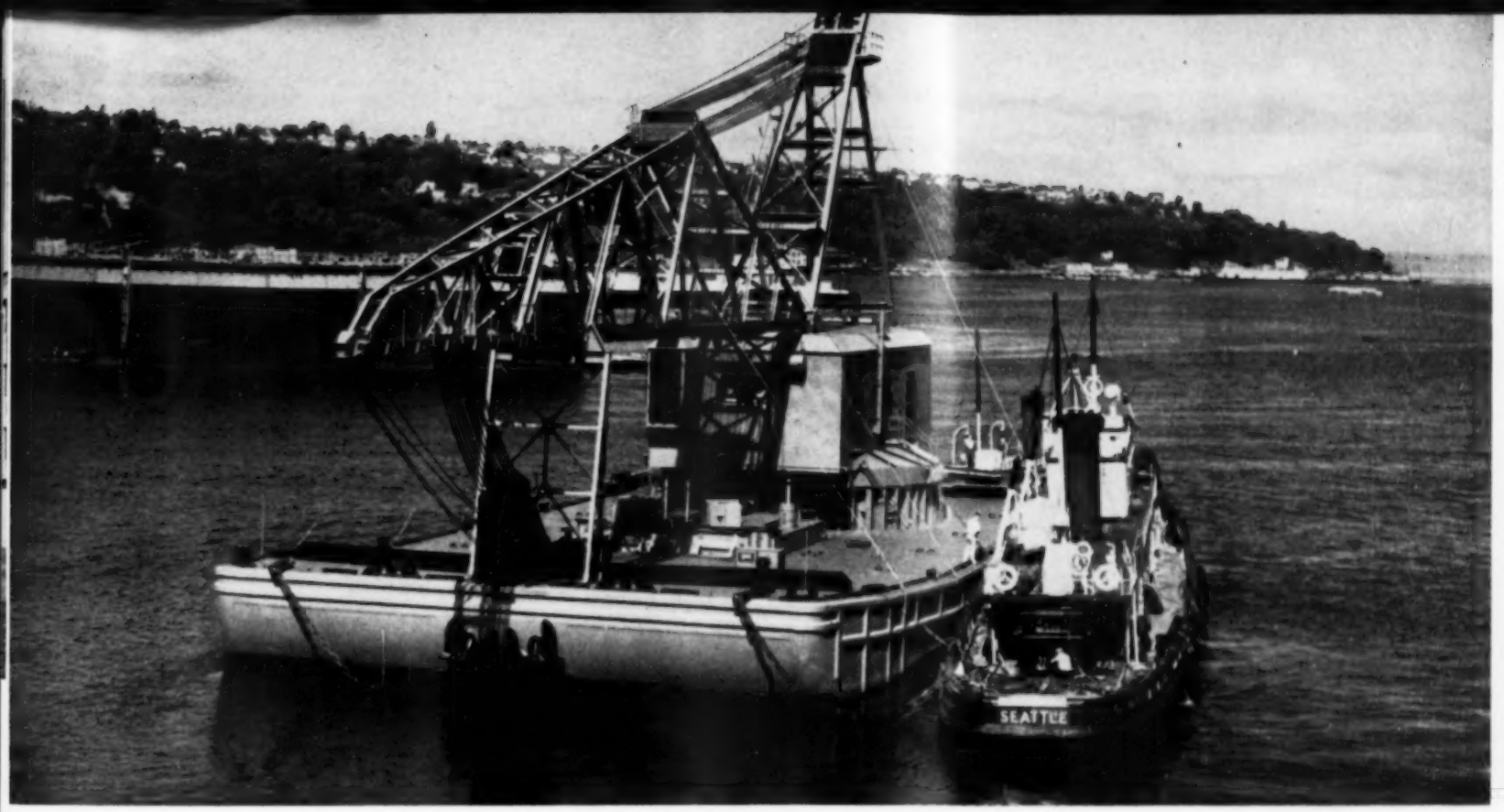


Close-up of one of the Union diesel generating sets aboard the new Navy floating cranes. Cuno filter in foreground, Ideal generator aft, Scintilla fuel equipment, and Titeflex flexible metallic hose in top foreground.

It is interesting to observe the difference in capacities of these two hoists that are rated at the same motor horsepower. The main hoist is designed to handle a 100-ton load at 80 ft. radius at 14 ft. per minute. The auxiliary hoist is designed to handle 15 tons at 122½ ft. radius but at a speed of 79 ft. per minute. It's the speed which counts.

The boom hoist has a single drum 75 in. in diameter and 91 in. long. It is powered with a 200 hp. electric motor to raise and lower the giant boom. The rotating drive unit to swing the crane and cab is powered by a 65 hp. electric motor which drives through Western Gear Works drive. All is magnetically controlled.

With this large electric load it is obvious that the demands placed upon the diesel generator sets are



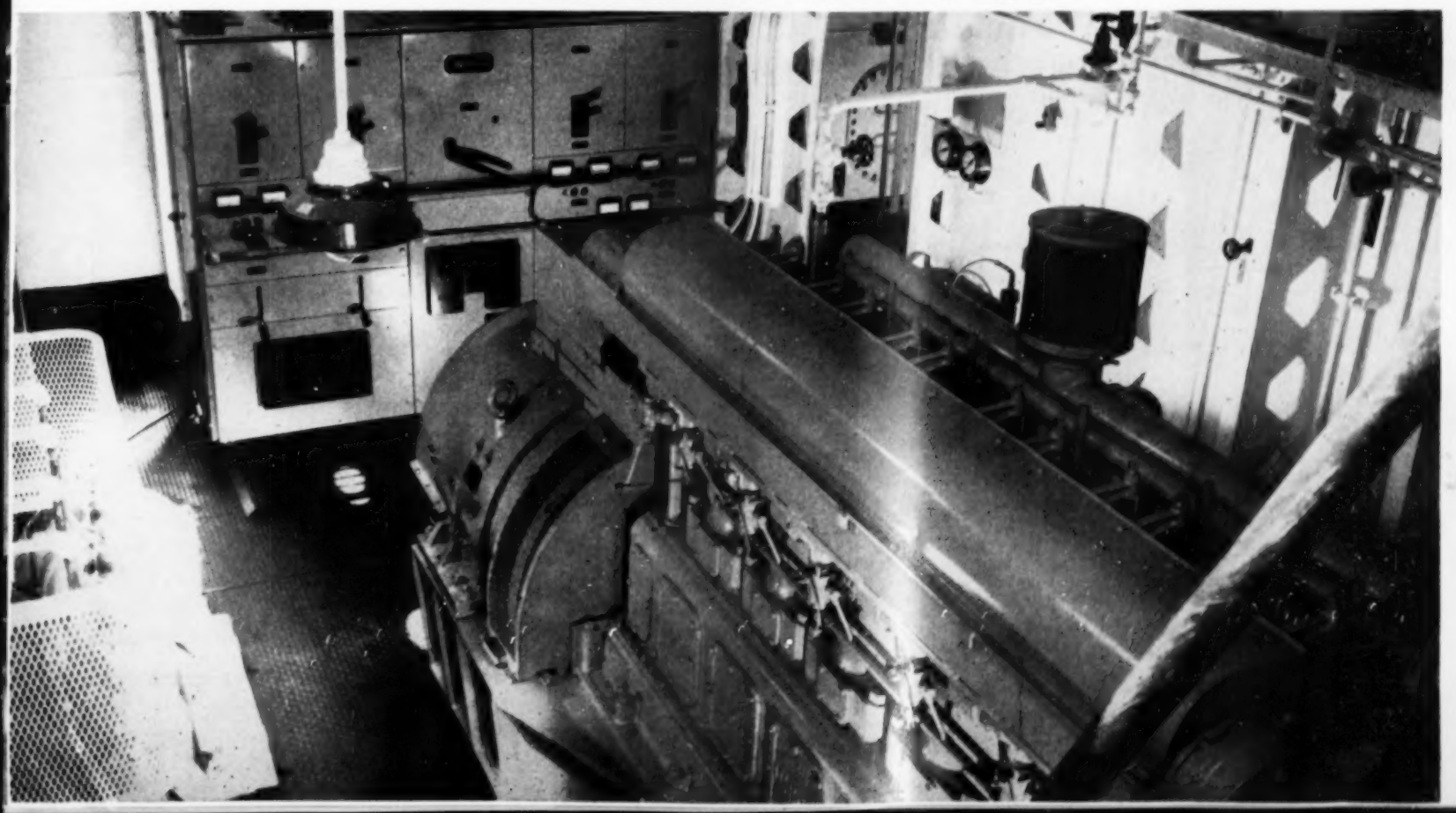
One of the Union dieselized Navy floating cranes being towed out of Seattle harbor.

unusually severe. In actual practice the loads are very light for some time, followed abruptly by demands in excess of rating of the generators. Peak loads will be carried for usually only a comparatively few minutes. A load demand chart on these floating cranes would be most rough. In order to successfully handle these severe conditions there were specified and supplied heavy duty rugged equipment. The diesel prime movers have more than enough power to fully load the Ideal generators. The combination of sound engineering with conservative ratings has assured maximum results.

The direct current diesel generator sets are paralleled throughout all load ranges. Particular care was given to this detail. Union diesel modified its engine design to provide exceptionally large inertia to the rotating system. The massive steel flywheel is fully enclosed, as are all other rotating parts. It materially assists in attaining constant angular velocity and assurance of proper parallel operation.

The Woodward governor is driven directly from the crankshaft at its flywheel end. This governor drive is independent of all other accessory drives and is most accurate because it is not influenced by other engine factors as are many governor drives.

Engine room showing a Union diesel generating set with Ideal generator; Scintilla fuel equipment; Air-Maze intake silencer; Brown pyrometer; Tuthill fuel pump; Maxim silencer (in stack); Fulton Sylphon temperature controls, and Marsh pressure gauges.



Both the *YD 193* and the *YD 195* underwent extensive tests. Here is one lifting a heavy load at the Todd Shipyards in Seattle.

The smooth operation of these sturdy generating sets is an outstanding credit to everyone connected with these cranes. Nowhere aboard them is there any vibration or feeling that there are internal combustion engine-powered units running aboard. The noise level within the divided engine room is modest. By contrast with many of the engines which are encountered in some services these diesels operate very quietly. Their exhausts are made nearly inaudible by Maxim silencers. Each diesel has built into its fabricated intake manifold Air-Maze filter which also acts as a silencer. Each diesel and its connected Ideal generator is mounted on a deep girdered fabricated steel sub-base. Each of these sub-bases is fitted with custom vibration isolator pads made from material obtained from Fabreeka Products Company.

The twin engine rooms are ample, well lit and thoroughly ventilated. Each is equipped with an overhead track with a manually operated hoist for handling heavy parts. From the quality of the equipment installed it is obvious that maintenance work will not have to be great nor will overhauls be made often, but when this work has to be done it can be done much more readily than in many installations.

The boom is 123½ ft. long, and the big swing rack gear is 40 ft. diameter with a 9-in. face and made up of 32 cast steel segments bolted together. To carry the load smoothly, 96 double-flange steel wheels 15 in. in diameter are placed between the cab frame and the fixed circular track. Another "first" for Pacific Car & Foundry was in the fabrication of the giant fabricated frame for the cab and hoists, the largest ever fabricated in the Pacific Northwest. They weigh over 60 tons each, measure 55 by 30 ft. in size and carry the entire rotating weight of nearly a million pounds. It took three trucks and semi-trailers working together to move the fabrications out of the shop and twin trucks to haul them crosstown to the shipyard. (Twin Kenworth diesel trucks did the job.)

The Navy floating crane *YD 195* shown as she was being towed from Seattle to San Francisco.

Test Data

In typical Navy fashion, the barges were tested to almost catastrophe! With no load and the boom at 105 ft. radius, it took 1 minute and 26 seconds to swing full 360 degrees clockwise, and 1 minute 21 seconds to swing counterclockwise. For a quarter-circle swing, with 125-ton test load, it took 28 seconds counterclockwise and 33 seconds clockwise. Tested at 168,000 lbs. at 104 ft. 6 in. radius the speed of lift was 14 ft. per minute and at 80 ft. radius the load raised to 200,000 lbs. and the speed was raised to 79 ft. per minute. The auxiliary hoist developed a lift of 33,600 lbs. at 122 ft. radius and 79 ft. lift speed per minute.

Buoyancy tests at loads varying from 85 to 125 tons came out perfect on every variation of boom radius. The main diesels developed into a habit of almost instant starts with less than 5 lb. air pressure drop, and never a failure under the heaviest overloads.

Auxiliary Machinery

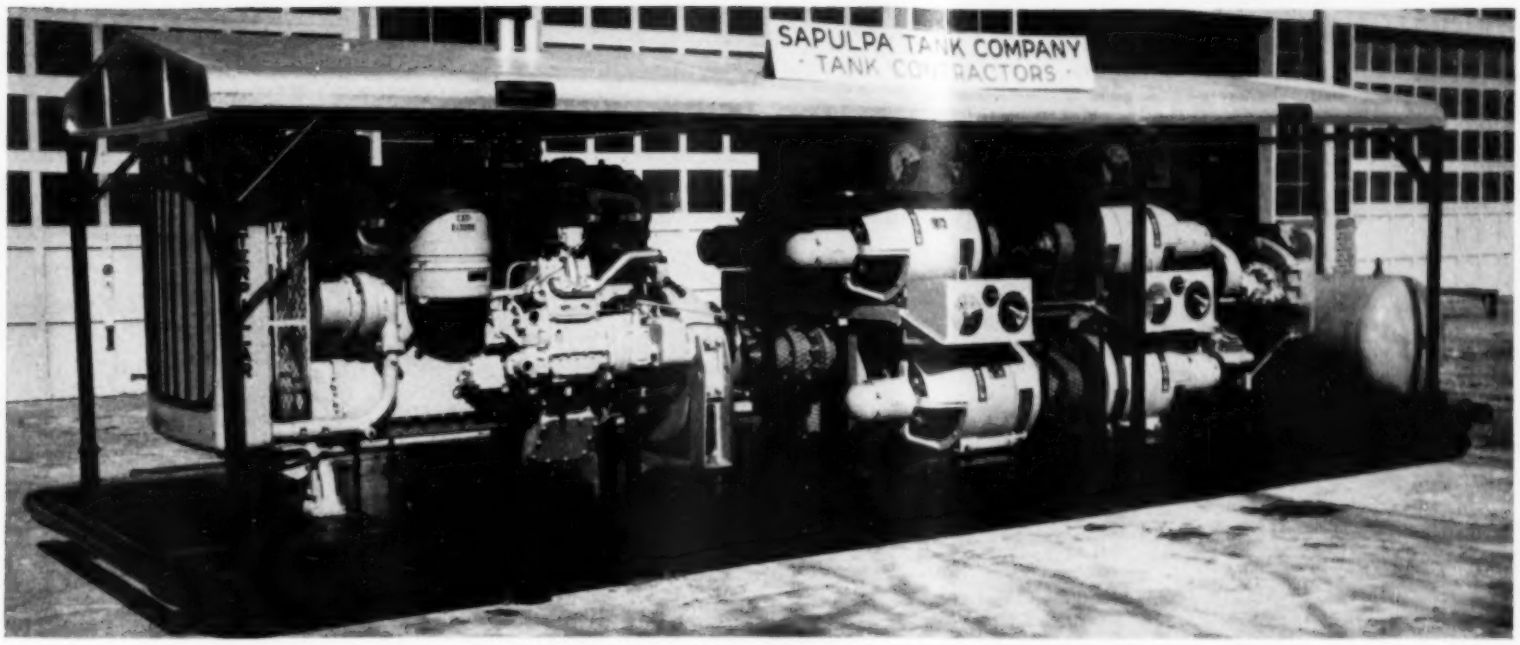
Auxiliary power in the ship furnished by main generator sets feeds a 10 kw. motor generator set by Reliance Electric Co. It carries a 15 hp. motor, operating on 230 volts dc. at 1150 rpm., and supplying 10 kw. at 120 volts for ship's services when the small auxiliary generating plant is shut down.

A 2-cylinder Quincy air compressor with cylinders 2½-4½ bore and 3-in. stroke and driven by a 5 hp. Reliance motor is fitted to charge the air starting bottles. A Marlow fire and bilge pump driven by 7½ hp. Reliance motor, fitted with Allen Bradley controls; a Deming ship's service pump with ¾ hp. Wagner motor and a double wildcat windlass by Marine Manufacturing and Supply Co., and powered by a 13½ hp. Westinghouse 230-volt, 700 rpm. motor and G.E. electric brake complete the auxiliary equipment list.

On this job the Navy supervision was by Capt. Linton Herndon's Seattle regional office of Supervision of Shipbuilding, who has direct charge of all Navy construction in private Northwest yards.

List of Equipment

Main Engines—Two Model GA6, 6-cyl., 8½-in. by 11-in., developing 225 hp. at 600 rpm. Union diesel.
Governor—Woodward.
Generator—Ideal.
Fuel equipment—Scintilla.
Intake silencer—Air-Maze.
Exhaust silencer—Maxim.
Temperature controls—Fulton Sylphon.
Filters—Cuno Auto-Klean.
Metallic hose—Titeflex.
Switchboard—Pelham.
Auxiliary engine—Two-cylinder, 20 hp. Nordberg.
Auxiliary generator—Kato.
Rotating unit drive—Western Gear Works.
Main hoist power—Westinghouse Electric.



The Caterpillar D13000 dieselized, skid-mounted welding unit which mounts eight 400-ampere Lincoln welders and a 182-ft. per minute Joy air compressor.

A SUPER WELDING UNIT

By **Jack F. Cozier**

SAPULPA Tank Co. of Sapulpa, Oklahoma, needed a mobile welding unit with sufficient power to strike eight welders all at once with a ¼-inch welding rod. The machinery was to be used in the field for big tank construction for the oil industry at Shawnee, Oklahoma. Sapulpa Tank went to the McCormick Machinery Co., Tulsa, Oklahoma, to come up with the answer. Under the supervision of Russell Snow, McCormick's sales engineer, the unit was designed and assembled in McCormick's shop in double quick time.

The welding unit is skid mounted, 25 ft. by 7 ft., featuring eight 400 amp., Lincoln welders and a 182 ft. per minute Joy air compressor, all powered by a Caterpillar D13000 diesel engine. The welders and air compressor are Gates Super belt driven, off of one shaft from the D13000, which has a 190 hp. intermittent rating.

There is a Twin Disc clutch just off the engine, to disengage it from the welders and an air compressor for starting purposes. However, the gasoline starting engine on the diesel engine (a feature of all Caterpillar diesel engines) will start the D13000 with a full load, regardless of weather.

Also, there is a Twin-Disc clutch at the end of the drive shaft, to disengage the air compressor when the welders are in operation. This unit was designed to meet the maximum power load called for in the specifications of Sapulpa Tank Co. and another petroleum industry requirement was met and conquered by a diesel engine.

The other side of Sapulpa Tank Company's welding unit. It features two Twin Disc clutches. One clutch can disengage the engine from the welders. The other is at the end of the drive shaft to disengage the compressor.

WHITE RIVER CONVERTS TO HIGHWAY OPERATION

Weyerhaeuser's Enumclaw Tree Farm All Set For Perpetual Harvest

by Charles F-A-Mann

Fully loaded Kenworth logging truck, powered by a 300-hp. Cummins diesel, heads downhill at White River. Nine Kenworth logging trucks are in use, with a Sterling and seven Whites.

THOSE who knew the Northwest of 1900 can recall one of the world's great coniferous forests stretching endlessly on the plateau and Cascade mountain foothills near Enumclaw and Buckley, Wash. It was difficult, half a century ago, to visualize anything big enough and strong enough to eat its way through the forest. But giant steam skidders and the yarders and the plodding steam railroad networks slowly cut it clean and moved on —leaving the land for others to worry about.

At the turn of the century the founders of the White River Lumber Co. chose a site far better than most of their contemporaries. They built a sawmill a few miles above town on an excellent site for a millpond, and built a flume down to the village of Enumclaw. There, beside the railroad tracks, they erected a planing mill and a ramshackle office and began sawing away at the magnificent Douglas fir that seemed to float endlessly, in the rough, from the mill and logging camp at Ellis-ton, four miles above town. The Hanson and Olson families settled down to a lifetime in the lumber business. Soon they were biting into the edge of vast areas of Northern Pacific and Weyerhaeuser

A load of logs being dumped at the mill from big Kenworth dieselized truck which has a 10-ft.-wide bunker with the capacity of a railroad log car. Around $5,000,000 has been spent at Weyerhaeuser's White River branch in modernizing the mill and converting the logging to a highway operation with mostly diesels as the prime movers.

Timber Co. trees. In time they went into partnership with Weyerhaeuser and expanded their mill. Eventually they built a big consolidated operation above the town, by the old millpond.

Today, half a century later, the second and third generations of these founding families are part of an empire that by standards of the old cut-and-scram school of loggers should long ago have folded up and moved away, leaving the snags and tall stumps to rot and a new forest to grow or a fire to sear the ground. But, for the third time, White River is moving on to bigger and more permanent things. Among the major factors affecting White River are the changing values of timber, steeply rising costs and the rapid advance of dieselization. The forester and the technician are on the payroll, and clumps of young trees once regarded as "brush" are guarded tenderly as they reach skyward at the rate of two to three feet a year. A new value on time itself is at hand. The day of the migrant logger is gone. The day of the tree farm (with its "Timber Is a Crop" slogan) is here. Although the vast stands of overripe, oversize timber are rapidly disappearing, second growth fir three feet in diameter can be found within five miles of the original White River mill office at Enumclaw. White River, now a branch of the great Weyerhaeuser Timber Co., is managed by heirs of the founders of the original company.

Some 18 months ago, following careful study by engineers, loggers, foresters and technical men who can evaluate a tree down to possible uses for its bark, it was decided that the steam railroad operation, the high lead skidders and the steam yarders (originally fired by cordwood and later by oil from California) all must go. White River had reached deep into the White River watershed and high up into the Cascade mountains. It had gone as far as it could and still fit into the new concept of industrial forestry.

A fullscale conversion to highway logging was begun, and a logging railroad that once reached 200 miles of standard gauge track was to be scrapped, along with all the heavy steam woods equipment. Down at the beautiful sawmill, new barely 25 years before, big changes were planned for its modernization. For the third time in White River's history more millions were to be poured into its vast "campus" in the woods and into the huge sawmill beside the old log pond. The network of highways followed two patterns: conversion of the old mainline railroad routes in the valleys into broad private logging highways, and conversion of the network of forest access roads (by widening and applying heavy layers of crushed rock) to logging roads capable of handling the 70,000-lb. loads down the 15 to 18% grades.

Only in the last 20 years has the lumber industry begun to consider seriously the idea of trees as a crop and as a permanently located manufacturing operation. The nation's first tree farm (Clemons Tree Farm, Montesano, Wash., also a Weyerhaeuser operation) was certified as recently as 1941. Today the country has 31,000,000 acres in more than 5000 tree farms certified in 26 states. Their slogan is "Trees Forever." White River Tree Farm is a result of 50 years of consolidating scattered holdings into a 130,000-acre forest where fir predominates in the lowlands and hemlock is the main species in the hills. The object is to balance cutting from the acreage, supplemented by purchases of small

ending and the highway age beginning. The "gyppo," with his daring concept of simplicity and extreme flexibility, was akin to a pioneer in the modern era of logging and forestry. His little truck that could haul one or two logs was the forerunner of today's giant diesel truck with its 300-hp. engine and 10-ft.-wide bunker that has the capacity of a railroad log car. His crude block and tackle loading rig spawned adoption of a giant steam shovel rig converted into what has become the heel boom loader. His 2-man crosscut saw now sports a 7½-hp. engine driving a 10-ft. chain saw so fast that two men can slice through the butt of a 6-ft. tree in less than 20 minutes.

Possibly $5,000,000 has been spent at White River in modernizing the mill and converting the logging to a highway operation with mostly diesels as the prime movers. The 20-mile main railroad grade paralleling White River was converted to a 26-ft.-wide road with maximum grade of 3%. Heavy rock ballast was put down to permit heavy, fast, 2-way operation. This entire operation is made up of private roads, and what the company saves in fuel taxes is applied to building more roads. Where they cross public highways they do so on bridges or crossings paids for by the company, avoiding the usual multiple vehicle taxes. The 10-ft.-wide log trucks, illegal on public highways, are exactly suited for rail log car replacement use. Branching off from the main logging trunk road, which terminates at the log dump at the mill, are some 58 miles of spurs which go up the mountains on 14 to 17% grades. There are 33 miles of U. S. Forest Service truck roads over which the company hauls

This Allis-Chalmers HD20 tractor, equipped with arch and blade, with a GM 6-110 diesel and Twin Disc clutch and torque converter, jockeys logs into position for loading operation.

John Wahl of Weyerhaeuser's head office at Tacoma devised a portable spar tree, a necessary adjunct in making White River's giant skidders and yarders portable and mobile. To provide great weight under the skidders to compensate for the mighty pull on cables, 64 log car wheels—discarded as the old rail operation was scrapped—were used under a single skidder *(above)*. Their flanges were cut off with an acetylene torch. The forward group is on a swivel truck, like a wagon, for turning ability. The 70,000 lbs. of iron weight and flat steel surface enable a husky Caterpillar diesel tractor to haul the skidder to position. The tongue is turned crosswise to keep it from rolling.

batches of timber from the Forest Service, so that by proper cutting, fire protection, reseeding and planting the new forest will follow the logger.

At first glance it would seem relatively simple to outfit a highway logging operation. The "gyppo logger" got by with little or nothing—generally a couple of payments on a truck, some saws, a few sets of block and tackle and some lengths of cable to rig up a loader. When the "gyppo" began to hunt for a few trees here and a few acres there, the industry let out a horselaugh that could be heard from Maine to British Columbia—failing to realize that the day of railroading in the big woods was

timber purchased from the Forest Service. Last, there are 113 miles of forest access roads used primarily for thinning, scaling, insect control, fire protection and timber inventory work. Tom W. Ilstedt, veteran Northwest logger, presides over this vast woods operation of about 190 square miles of company land and as much federal tributary land.

Because economics and physical difficulties make hard-surfaced roads impractical, the building and maintenance of the White River roadway system require a setup similar to a small-scale county road department, with its own equipment. Included in the road equipment are: 2 WB 22-64 White dump trucks, 4 F800 Ford dump trucks, 1 605 Koehring 1½-yard shovel with 6-71 GM diesel, 1 Bucyrus Erie 1½-yard shovel with a TD24 185-hp. International diesel, 1 Bucyrus Erie 22b shovel with a Chrysler 8 gas engine, 1 No. 20 Bucyrus shovel with a Hercules gas engine, 1 M.C. 4 Lorain mobile shovel and crane with a Cadillac gas engine and Hydramatic drive (the truck for this is powered with a 140-hp. Waukesha engine), 1 No. 12 Caterpillar road grader and 1 Allis-Chalmers road grader with a 4-71 GM diesel. Auxiliary equipment for the road plant includes: 1 No. 315 Ingersoll-Rand air compressor with a TD18 International diesel (portable), 1 210 Sullivan air compressor with a Buda gas engine (on skids), 1 105 Sullivan compressor with a Buda gas engine (portable), and 2 No. 4600 Caterpillar generator sets, 30 kw., 110-220 volts, ac.

Tractor and arch equipment includes 5 180 hp., TD24 International tractors with blades and Carco drums; 2 Allis-Chalmers HD19 tractors with GM 6-71 165-hp. diesels and Torquemaster drive; 1 Allis-Chalmers HD20 tractor, equipped with arch and blade, with a 6-110 GM with Twin Disc clutch and torque converter; 1 TD14 90-hp. International tractor with blade and drum; and 1 D6 Caterpillar tractor with a log unloader crane of new design. These two groups of equipment carry the logging operation from primary highway building, with the blade-equipped tractors going where trucks and conventional road gear can't go. Steep trails wide enough to handle the log arch behind a tractor go to every tree. The trees are felled, bucked into 40-ft. sections by high-powered chain saws and then hauled to the spur roads to begin the journey to the mill. Some logs are so big and the terrain so rugged the diesel yarder must make the big pull.

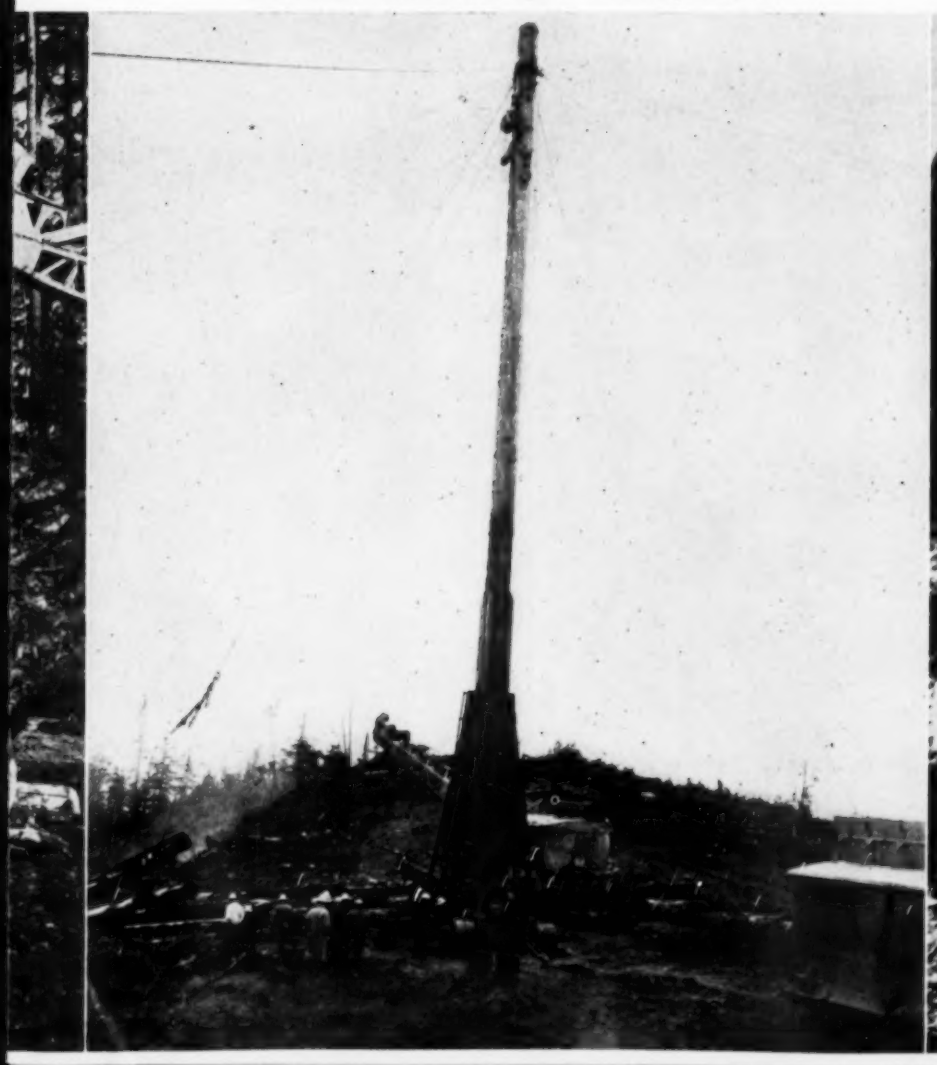
Yarders in use at White River include 1 B.V. No. 151 Skagit yarder with a 200-hp. Waukesha Hesselman diesel; 2 B.V. Skagit yarders, each with a 115-hp. Waukesha; 1 Clyde yarder with a 225-hp. Waukesha diesel; and 1 Washington 208 yarder with twin 6-71 GM diesels with Allison torque converters and 2-speed Torquemaster controls.

The loaders, which resemble steam shovels, constitute a fourth category of equipment. Many are directly converted from steam shovels. They simply pick up an entire log from a pile built up by the yarders and tractors (which haul logs from where they were felled and bucked) and load it onto the big line-haul diesel trucks. Three loaders are used: 1 model 80 Northwestern shovel converted to a loader, with a 100-hp. twin city gas engine; 1 model 604 Koehring Army crane converted to a loader, with a 165 Waukesha gas engine; and 1 Washington Trac-Loader, T.L. 15, with a 6-71 GM diesel and Allison torque converter and Torquemaster air controls. Seven Carco log arches are used to run behind the tractors in hauling individual logs.

White River uses these logging trucks: 9 No. 548 Kenworths powered by 300-hp., 6-cylinder HRDS 600 Cummins diesels; 1 Sterling powered by a 300-hp. Cummins diesel; 5 WB and WC Whites with 180-hp. gas engines; and 2 Whites with 135-hp. gas engines. In the category of miscellaneous rolling stock and service equipment are 5 Ford panel trucks, 8 Ford pickups, 1 Chevrolet pickup, 10 Ford fire trucks and 7 Ford 20- and 30-passenger buses. And winding up the list of equipment is a 1000-hp. Fairbanks-Morse road switcher diesel locomotive used for a 4-mile switch haul from the sawmill.

An elaborate communications system in the woods, mostly radio, and the big garage-shop where the entire fleet is maintained and serviced help to make Weyerhaeuser's new White River operation one of the finest in North America. Barely 35 miles from Seattle and Tacoma, this great tree farm and mill —begun while the Spanish American war was making headlines—can look forward to the next century, thanks to present longterm planning and balancing tree harvesting with timber growth. And when Ed Dukowitz, gas and diesel maintenance supervisor who is the mechanical boss of the whole White River fleet, is an old man he can start training his grandson to run the works, secure in the knowledge that his job will still be going strong.

International diesel tractor hauls this fully portable, 103-ft. spar tree around the woods. It is nursed by the winch truck, which raises and lowers boom when positioned. The spar tree, designed and built in White River's shops, is shown fully rigged for operation. Diesel loader stands behind it and a portion of the mobile diesel skidder is shown at lower right. ***Photo by Ken Meister.***



Returning by the same trail it had bulldozed previously through a muddy hillside, this International TD24 diesel tractor hauls a heavy load of logs in a Carco arch. International, Caterpillar and Allis-Chalmers diesel tractors are included in White River's tractor and arch equipment.

BEATTY MEMORIAL HOSPITAL

A CIVIL DEFENSE INSTALLATION

INDIANA citizens had known for years that their state needed to do something drastic to improve facilities for the care of mental patients. Following World War II, state officials took action. A completely new modern institution for mental cases was started in 1948 on a large tract about 14 miles south of Michigan City and a mile outside the village of Westville. Additions are still being made to this community, designed for the care, treatment and, where possible, restoration to normal health of those suffering from mental abnormalities and mental breakdowns.

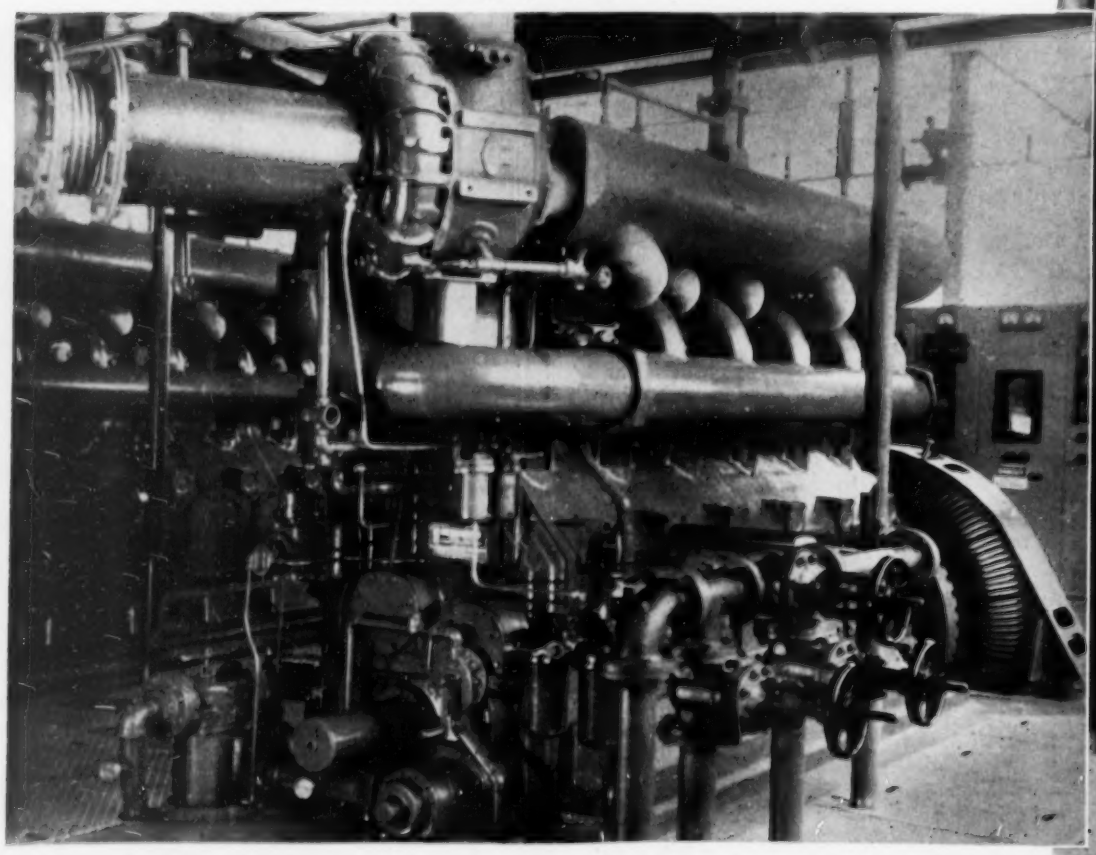
Because of the size and location of the institution, known as the Dr. Norman M. Beatty Memorial Hospital, it was necessary to provide complete utility service on the site. Water supply, sewage disposal, steam heating, refrigeration and electrical energy supply had to be provided. A combined heating, power and water works plant was designed and constructed during 1948 and 1949, which provides high-service water pumping; steam for heating, laundry, kitchen and medical services; and standby power facilities. Electrical energy is normally supplied to the institution by the Northern Indiana Public Service Co. from its transmission system. This station has been called upon to deliver as much as 46,000 lbs. of steam an hour at 145 psi. gage, and up to 450,000 gallons of water per day. The present maximum electrical demand is 750 kw. on a base load basis.

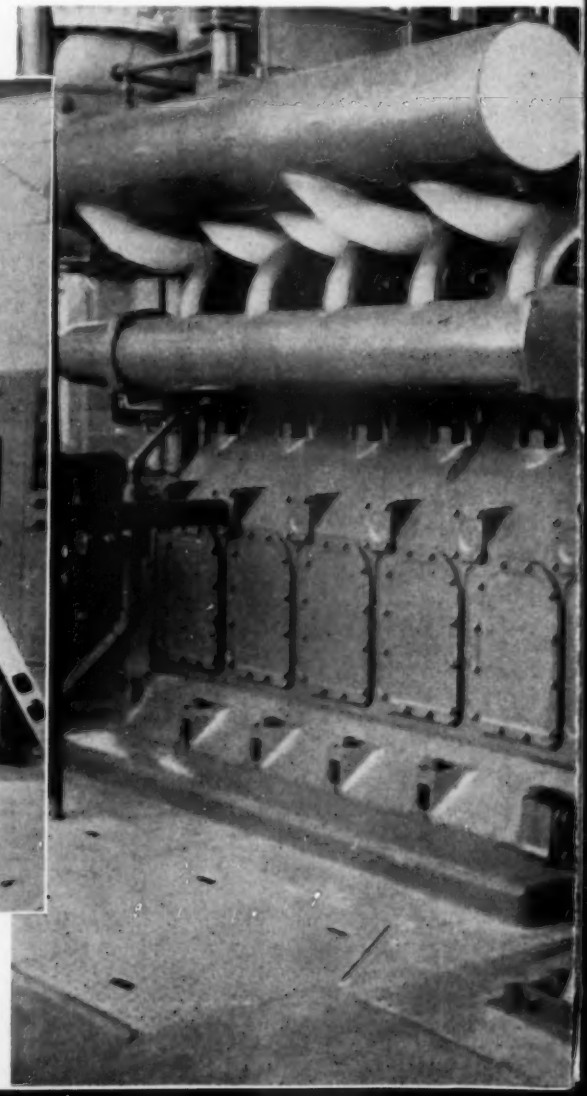
Continuity of electrical supply is a "must" for a mental institution because many patients are afraid of darkness. To assure that continuity of electrical energy supply, two 855-hp. Nordberg supercharged diesels, together with 600-kw. alternators, were installed in the power plant. These units are available at all times to carry the entire electrical load of the hospital whenever the need may arise. During the 5-year period the units have been installed, they have been called upon at least seven times to supply the load of the hospital. In every instance they went into action because it was necessary for the utility company to de-energize the line supplying the hospital for line maintenance or repairs, or for change of transformers at some point on the line. The standby generating facilities consist of two identical Nordberg engines with Burke Electric Co. alternators and exciters. Each diesel engine

is a 5-cylinder, 4-cycle, 13-in. by 16½-in., supercharged unit delivering 855 bhp. at 514 rpm. The generators are rated 600 kw. at 0.8 power factor. Excitation is at 125 volts. Superchargers are Elliott type BF34 with a maximum speed of 16,000 rpm. Speed control is accomplished by a Woodward type UG8 governor on each unit.

To assure starting of the engine at all times, a dual-drive is provided for the starting-air compressor. Under normal conditions the pressure is maintained in the starting-air tank by means of a motor-driven compressor. A Wisconsin gasoline engine, mounted on the opposite side of the compressor

Elliott turbochargers serve both Nordberg engines. Also shown are the Purolator lube filters, the Blackmer fuel oil transfer pump and Nugent duplex fuel filters.





from the electric motor, is available for driving the compressor in the event of power failure. Engine cooling is provided by a Young model 350 full-flow engine jacket water cooler. Barber-Coleman temperature controls for adjusting the dampers regulating air flow through the cooling unit together with Fulton Sylphon thermostatic control valves in the jacket water circuit maintain the desired jacket water temperature conditions. The Young cooling unit is located inside the building to eliminate the possibility of freezing at any point on the jacket water system. This feature insures continuity of cooling whenever the generating units might be called upon for emergency service.

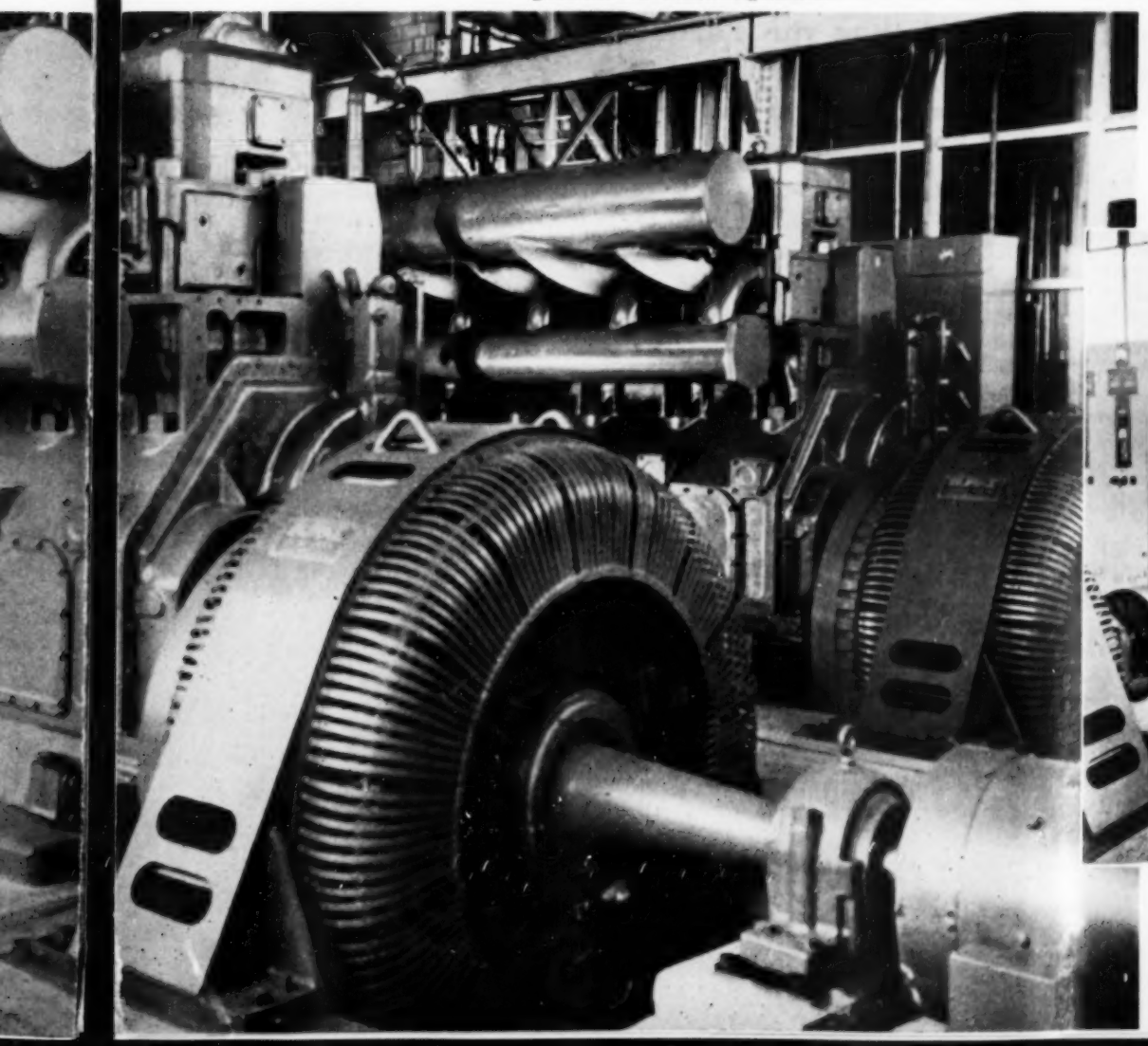
Two centrifugal pumps, each having a capacity of 300 gpm. at 50-ft. head, are used for circulating water through the engine jackets and cooling radiator. The cooling water is supplied to both engines from a common header and either or both pumps can serve the header, depending on the quantity of cooling water required. Control of all electrical energy is by means of General Electric metal clad switchgear. This gear consists of an incoming-line section, two generator-control sections, bus metering compartment and seven feeder circuits. Power is distributed in underground cables at 4160 volts to transformers located in the various buildings where it is reduced to 110 and 220 volts for general service. Station auxiliaries are supplied from transformers located in a basement underneath the switchgear readily accessible from engine room.

The engine room, located in the northwest corner of the power plant building, is approximately 45 ft. by 55 ft. in plan. It houses the two Nordberg diesel generating units, station power transformers, 4160-volt switchgear and low-voltage switchgear for power plant auxiliaries. A 5-ton overhead traveling crane facilitates maintenance in the engine room. Fuel oil used in the installation is Standard Oil diesel fuel. Lubrication is done with Standard HD, SAE 30 oil. That this standby generating installation has proved its necessity in the proper functioning of the Beatty Memorial Hospital is borne out by the fact that one unit had been used for 302 hours and the other for 324 hours in emergency service up to last March 1. This plant has guaranteed the continuity of electrical service so necessary for the successful functioning of one of the most modern mental hospitals in the United States.

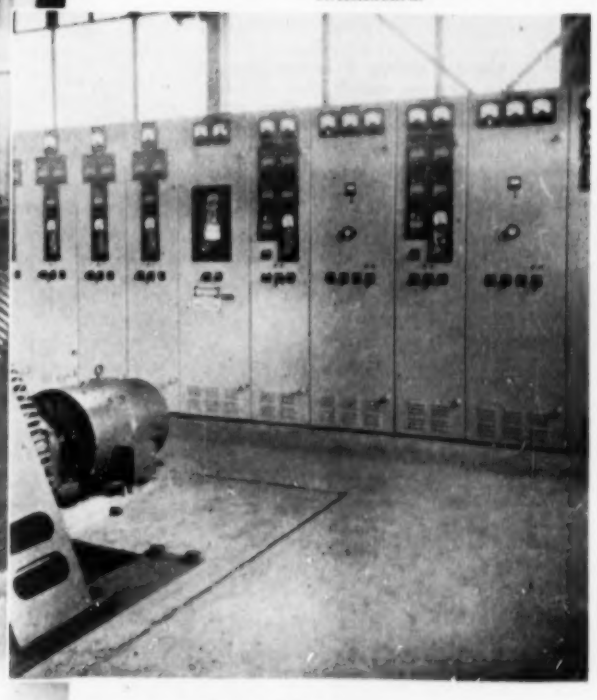
List of Equipment

Diesel engines—Nordberg.
Generators—Burke Electric.
Exciters——Burke Electric.
Superchargers—Elliott.
Governors—Woodward.
Exhaust mufflers—Maxim.
Intake-air filters——American Air Filter.
Radiator—Young Radiator.
Lubricating-oil coolers—Ross.
Jacket-water pumps—Weinman.
Lubricating-oil filter—Purolator.
Fuel-oil transfer pump—Blackmer.
Starting-air compressor—Quincy.

Exhaust side of the two Nordberg standby engines showing 600 kw. Burke Electric Co. generators and Woodward governors.



Control of all electrical energy at the hospital is handled by this modern General Electric metal clad, dead front switchboard.



A Petter diesel on an orchard sprinkler irrigation system east of Yakima, Washington. The rig assures good peach, plum and apricot crops where rolling land cannot be irrigated by gravity systems.

DIESELS HELP CONSERVATION IN NORTHWEST

Retail Farm Equipment Dealers Cooperate in Selling the Farmer and Industry on the Importance of Saving Soil for the Future

By F. HAL HIGGINS

WHEN Harold B. Halter of the National Retail Farm Equipment Association appeared on the program of the National Association of Soil Conservation Districts in New Orleans recently, he had a vital story to tell about how the farm equipment industry has helped put across soil conservation practices. He spoke for the 17,000 dealers who make up his organization. And what he had to say about the accomplishments of men and tools in the dieselized farm field was important for these reasons: Nearly every farm equipment dealer in NRFEA is now, or soon will be, a diesel merchandiser. Farmers and conservation men in the western irrigated area know diesels. The soil conservation organizations have been fighting the administration's economy moves that have cut appropriations for soil conservation work; hence, the subject has become controversial, especially within political and farm organizations.

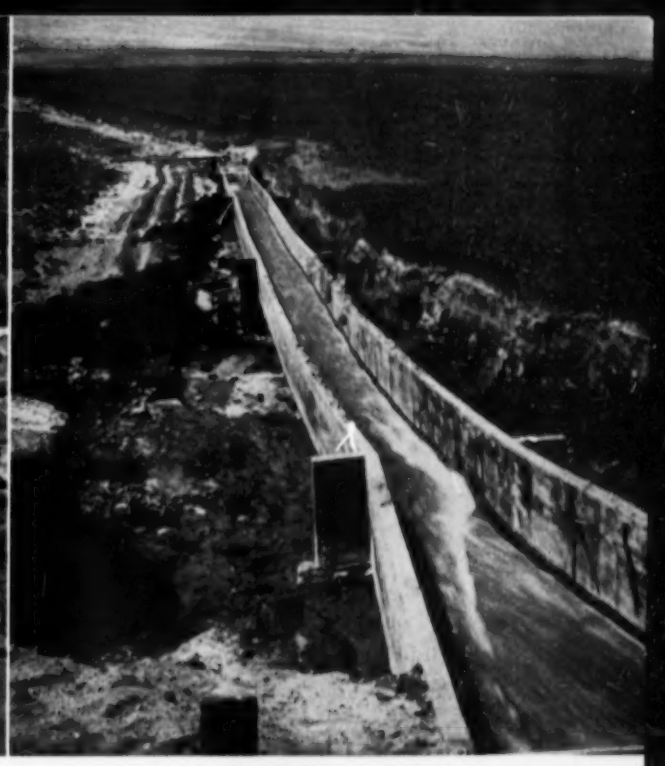
Farm equipment dealers, who serve as liaison men between farmers and manufacturers, are organized in 33 states and regional affiliated associations in the national group. How have these retailers been convinced that their participation in the conservation movement is needed and warranted? DIESEL PROGRESS has helped encourage their interest by publishing such articles as "Diesels Spearhead Soil Conservation Campaign," which appeared in the January, 1950 issue and illustrated dieselized farm equipment being put to sound conservation uses. Another way, according to Harold Halter, is to point up the dollars-and-cents value: "We have complete instructions showing how a dealer can use a simple survey form and talk to five or six good conservation district cooperators to learn in dollars and cents how much more income conservation has made possible from their farms."

A Cat D2 discing a cherry orchard cover crop on owner Elon Gilbert's land. The cover crop has been previously mowed to assist in retaining moisture supplied by sprinkling.

Here are some convincing figures, given on a per-acre basis, taken from 2000 surveys made last year that show average annual increases per farm of $3020 via the conservation route. More than 680 farmers reported average increases of 28 bushels of corn; 358 averaged 12 bushels more wheat; 324 gained 21 bushels of oats; 136 increased soy bean production by 11 bushels; 454 reported gains of 1.46 tons of hay; and 252 cattlemen had gains of 102 lbs. of beef.

When the farm equipment industry, conservation districts and the federal government cooperated to

"Easy steps" to soil conservation via diesel tractors. Contour plowing to prevent erosion of hills being farmed.



A concrete irrigation water chute on a Northwest farm. Photo shows how costly erosion is stopped.

stage their now historic 3-day conservation meeting at Pendleton, Ore., the event drew national attention and a big attendance of farm equipment manufacturers, agricultural engineers and farm leaders who visited various projects being carried on in this old wind- and water-eroded wheat empire on the edge of the Columbia river. The gathering at Pendleton gave visitors a chance to see "before" and "after" conservation practices on every side.

The Northwest is split into two distinct areas insofar as conservation is concerned. The west coast as far east as the Cascade range gets too much water. East of the mountains, it is a matter of the old dry farming system, except for the valleys where irrigation water has arrived. The harnessing of the Columbia river is bringing in great areas of the Big Bend country that lacked enough precipitation over the last century to support frontier farm families. This is being changed with final development of the distribution system from the gigantic Grand Coulee dam.

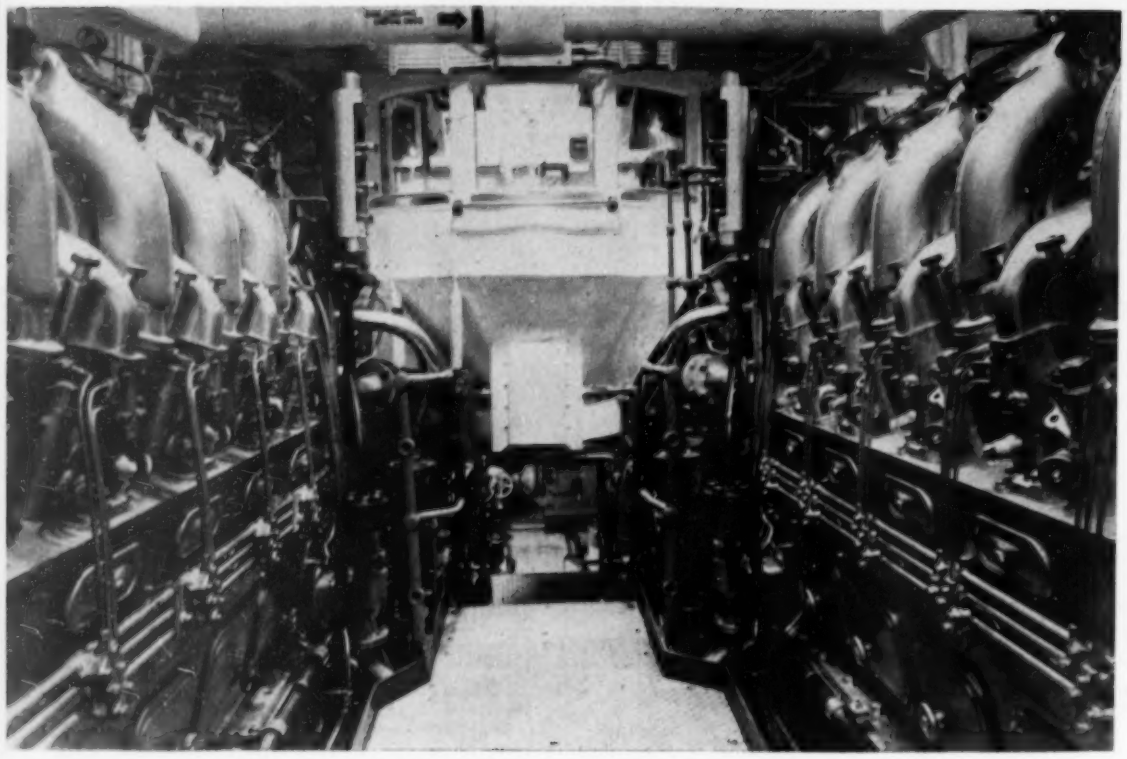
Soil conservation has made great strides. Farmers have accepted the challenge of anchoring their topsoil and building it up faster than it can be carried away by wind and water. Not only are farm equipment dealers sold, but bankers are making loans on the basis of farmer practices in conservation methods. Conservation is being taught in the schools through field trips in which students learn that farmers who allow their lands to wash and blow away are reducing farm incomes and lowering living standards as well as cutting into taxes for schools and roads.

Oregon is not as strong as Washington in conservation districts because it is an older state with a strong agricultural college extension service that has worked effectively to build up sound soil practices through its county agents. But along the Columbia river in the wheat farming areas that slope down to the river, there is greater farmer interest in soil conservation districts—people like Claude Meyers of the West Umatilla Soil Conservation District. But so big and ruggedly independent are many of the old wheat farmers that many prefer to do their conservation work in their own way and at their own time. As a result, not all of the conservation job is done.

A drive up the river from Portland to Pendleton took the writer past this area with stops to visit some of the big ranchers. All are dieselized. We saw a pair of TD14 International diesel tractors with special cabs added for protection against the cold winds and fogs of fall and winter. On neighboring ranches we saw Internationals, Allis-Chalmers units and Caterpillars, with an occasional Cletrac (Hercules engine). Standard of California, Shell, Union and General Petroleum trucks were seen delivering fuels and lubricants to ranches from their local stations. Such companies as these and Associated, Texaco and Richfield have distributors who are as well aware as the farm equipment folks that more and better business lies in continued and improved soil conservation.

International TD15 pulling a subsoiler in eastern Washington to enable water to penetrate the soil.

Brush clearing in the Pacific Northwest with an International TD9 to add to farmland.



The main engine room of a Canadian HMCS minesweeper, looking aft and showing the main Cleveland diesels and control positions. Marquette governors are used on all main and auxiliary engines. A soundproof control room is in the background.

of the 35 men in the ship's company has a roomy, practical aluminum locker. In succeeding ships of the same class, advantage is being taken of more recent developments in non-magnetic equipment and machinery to improve their capabilities further. Seven of the first 14 minesweepers ordered have been completed and the remainder are scheduled to be in commission shortly.

These minesweepers have twin-screw drive, using 12-cylinder model 278A GM 2-cycle engines driving through reduction gears. The ship with this machinery has a rated total of 2400 shp. at 370 rpm.

Because of the type of hull and the service intended, the Canadian Navy has established very high requirements for shockproofness and, to meet these requirements, it was decided that shock mounts should be provided for the main propulsion engine and reduction gear assembly.

The mounting of units of this size on shock mounts involved many engineering problems, of which an important one was the provision of flexibility in the propeller shaft system to permit motion of the engine without damage to the drive. This problem was solved by the use of double couplings on

CANADIAN MINESWEEPERS

HMCS *Gaspe*, Canadian minesweeper, under way. Dependable diesels assure reliable power.

AS part of her contribution to the forces of the North Atlantic Treaty Organization and to meet the requirements for the defense of her coastal waters, England in 1949 embarked on a warship construction program far beyond any ever previously undertaken in the country's peacetime history. The original program included contracts for the construction of four minesweepers. In 1950 10 more were ordered, and in 1953 the number was increased to 20, with the contracts spread among nine shipyards across Canada. Of the first five minesweepers to be completed, four were turned over to France this year under the Mutual Aid Program of NATO. Two more are scheduled to follow.

From a basic British design, Canadian naval architects, engineers and shipbuilders have developed a minesweeper which, when finished, represents an entirely new departure from established design, construction and general engineering. New techniques and materials have been used, both with a view to adding to the ships' efficiency and to taking the best advantage of North American resources. The hull is a composite of wood and aluminum, aluminum being used for the frames and bulkheads and wood for the skin. Long-standing shipbuilding practices have been discarded and new methods developed to suit the peculiarities of aluminum. The comparatively recent developments which were adopted in the construction of the new minesweepers were: aluminum extension of new sections; new rivets; and advanced welding methods.

The sweepers have a displacement of 390 tons, are 152 ft. in length and have a beam of 28 ft. They are equipped with the latest navigational, radar and minesweeping equipment. Mess-decks are fitted with bunks and foam rubber mattresses and each

Two of the several HMCS minesweepers seen at the dock in Halifax, N.S. on the day they were turned over to France under the terms of the NATO program.

each shaft, with one end mounted directly on the reduction gear low speed flange and the other connected to the propeller shaft. The use of the shock mounts and flexible shaft coupling has resulted in the propulsion units being effectively isolated from the hull as to vibration and noise as well as from a shock standpoint. This makes one of the smoothest geared propulsion units of its size and one of the quietest ships of this type developed.

For auxiliary power and special service power, a combined unit was developed for the Canadian Navy, made up of the 3-cylinder model 268A GM 2-cycle diesel engine, rated 150 hp. at 1200 rpm., driving a 75 kw., 440-volt, ac. auxiliary power generator and a 25 kw., 220-volt, dc. special service power generator mounted on the same shaft and supported by a single outboard pedestal bearing. The 3 kw., 120-volt, dc. exciter for the alternator is mounted on top of the alternator and driven directly from the engine by a separate power takeoff. The complete assembly is mounted on the same type of shock mounts as the main engines. All of the generator equipment, as well as the necessary voltage regulators, rheostats, engine starting controllers and battery charging equipment, with the exception of the voltage regulator equipment, are of special design for this particular application.

The requirement for parallel operation of both the ac. and dc. units of these generator sets required the solving of several unusual problems from the electrical as well as engine standpoint.

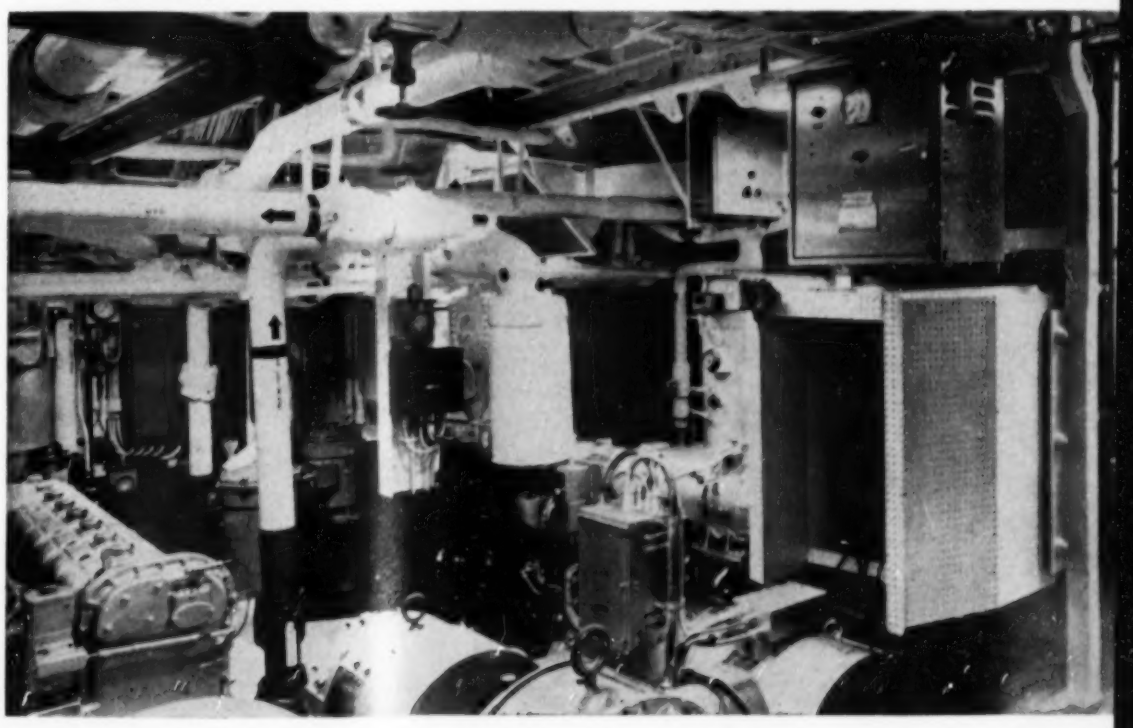
For minesweeping power, the Canadian Navy selected an 8-cylinder GM model 268A diesel engine driving a 540 kw. generator. The engines were designed for high shock loads and the complete assembly was mounted on shock mounts. Among the major accessory items furnished with the main engines were special non-magnetic compressor units, mounted on shock mounts and arranged to supply air both for main engine and minesweeping starting, and for clutch operation. Special stainless steel storage tanks were required for the high pressure engine starting air and also for the low pressure clutch air surge tanks. The clarifier as well as the lube oil and water coolers were built of non-magnetic materials. Propulsion controls for both main engines and their gears are combined in a watertight, soundproof room. Here, the combined throttle and clutch control levers for each unit are mounted in GM's standard mechanical control pedestal, flanked by necessary operating gauges and signal devices connected with the pilot house.

In the case of model 8-268A and model 3-268A generator sets, all accessories are mounted on the unit, making them completely self-contained with the exception of the filter for the 8-cylinder engine.

This arrangement greatly simplifies installation and piping for the shipbuilder and permits complete testing of the unit exactly as it is to be furnished at the engine builder's plant prior to delivery to the ship. Plans, instruction books and parts lists have been supplied to the Canadian Navy for use aboard ships and also in sufficient quantity to supply the training schools of the Canadian Navy on the east and west coasts.

The first minesweeper of this class was built at the Davie Shipbuilding, Ltd. yard at Levis, Quebec, and was delivered to the Canadian Navy late in 1953. Other Canadian yards building minesweepers are: Canadian Shipbuilding & Engineering, Ltd.; Canadian Vickers, Ltd.; Port Arthur Shipbuilding Co., Ltd.; St. Johns Dry Dock Co., Ltd.; George T. Davie & Sons, Ltd.; Marine Industries, Ltd.; Victoria Machinery Depot Co., Ltd.; Yarrows, Ltd.

View of the generator room. It houses a GM 2-cycle Model 268A diesel, rated at 150 hp. at 2000 rpm. driving a 75 kw. ac. generator and a 25 kw. dc. generator mounted on the same shaft.



NEW CUMMINS "PT" DIESEL FUEL SYSTEM

By **DOUGLAS SHEARING**

A REVOLUTIONARY new "pressure-time" fuel system which can be applied to all Cummins diesels built since 1932 has been introduced by Cummins Engine Company, Inc., Columbus, Ind., as standard on all engines effective July 1. Rumors that "Cummins is coming out with something new" started last year and were confirmed by an announcement from General Sales Manager Raymond Boll, who pointed up these facts about the new "PT" pump:

1) It is a diesel fuel system as simple and as easily understood by the average mechanic as the carburetion and ignition system of a gasoline engine. 2) It contains fewer parts than the carburetion, spark and governing systems of heavy-duty gasoline engines or all other diesel fuel injection and governing systems. 3) It can be applied to practically all Cummins diesels built since 1932 at a very nominal cost to the owner. 4) It removes previous limitations on high-speed diesel engine rotative speeds, which will make possible still further gains in horsepower-weight ratios in new engine designs. 5) It promises drastically reduced maintenance cost. 6) The system is interchangeable for all Cummins models from 100 to 600 hp. (except for minor changes in the 12-cylinder gear pump capacity). 7) It is not timed to the engine. 8) It has other advantages in connection with special governing and control requirements.

Early versions of the new fuel system were used experimentally on the 1950 and 1952 Cummins race car entries in the Indianapolis "500." These engines were operated at speeds in excess of 4000 rpm. Next, Mr. Boll reported, 50 experimental fuel systems were placed in the field on trucks and mining equipment. Then the Cummins Engine Company decided to take an unusual step in the commercial release of its new development. Instead of "hand-built" pilot test units, Cummins went ahead with complete production tooling, an approach that eliminated the customary manufacturing problems associated with new mechanical devices. The initial "tooling up" for jigs, fixtures, patterns, inspection equipment and other production tooling activities cost more than $300,000. These production facilities were used to turn out hundreds of "PT" fuel systems for extended field testing throughout the country under the supervision of the company's dealer organization.

Dealership personnel have been trained in the maintenance and operation of this system. They have the necessary special service tools and adequate stocks of spare parts. Instruction manuals, parts books and sound strip films were sent out to dealers to assure proper maintenance techniques. In addition, eight specially trained factory representatives were stationed throughout the nation to train dealership personnel and to report on results of the large field test program.

By the time Cummins was ready with its general announcement of the new diesel fuel system, a total of 21,000,000 miles had been accumulated on more than 400 production type field test units. Some of them have accumulated in excess of 100,000 miles without requiring attention. Some of the earlier laboratory-built units accumulated over 125,000 miles with minimum maintenance.

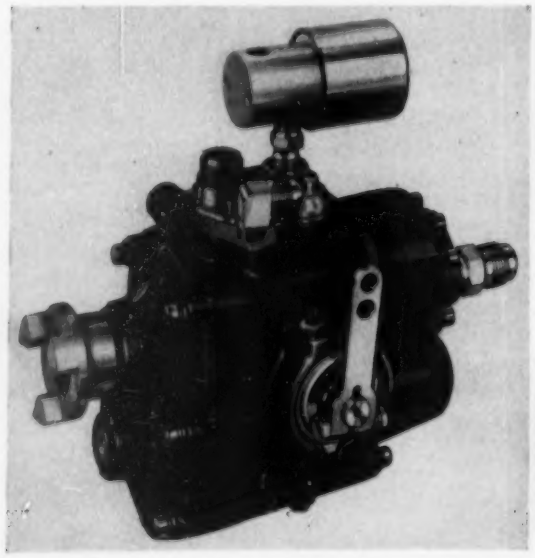
The Cummins "PT" fuel system, which incorporates a new application of basic hydraulic principles, derives its name from its method of operation, which is simply a combination of pressure and time. A low-pressure pump delivers fuel to the injectors at a varying pressure determined by the throttle or governor control. The "time" is a function of the engine speed. More precisely, the time factor is the length of time during which the injector's metering orifice is open. Hence, in a given time interval and with a given pressure, a given amount of fuel will be delivered to each cylinder. More pressure—more fuel—more horsepower.

The principle of the "PT" diesel fuel system is based on the fact that by changing the pressure of a liquid flowing through a pipe the amount of liquid coming out of the open end is changed. Increasing the pressure increases the flow or the amount of liquid delivered, and vice versa. In applying this principle to the diesel fuel system it was necessary to provide:

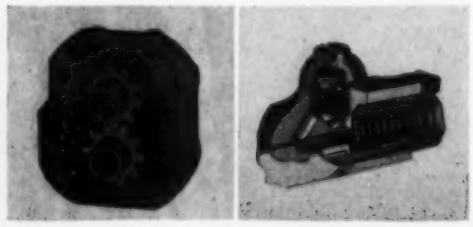
1) A fuel pump to draw fuel from the fuel tank and deliver it to individual injectors for each cylinder. 2) A means of controlling the pressure of the fuel being delivered so the individual cylinders would receive the right amount for the power required of the engine. 3) Fuel passages of the proper size and type so the fuel would be distributed to all injectors and cylinders without restrictions. 4) Injectors to receive low-pressure fuel from the fuel pump, meter it, and deliver it into the individual combustion chambers at the right time, in equal quantity and proper condition to burn.

The system consists of the fuel pump (with governor), the supply and drain lines and the injectors. The fuel pump is made up of these main

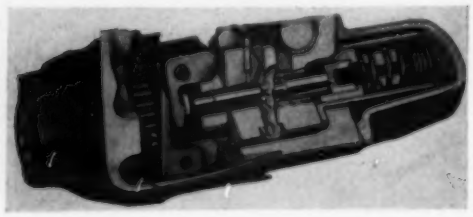
The new Cummins PT fuel pump which has fewer parts, and weighs considerably less than its predecessors.



Below, left: **Cutaway of the gear pump section which pulls fuel from the tank and *right*, the pressure regulator.**



Cutaway of the governor which controls both idling and maximum engine speeds.



The PT fuel injector. The unit meters and delivers the fuel without fuel rack, check valves, spring loaded needle valve or helixes.

After More Than 21 Million Miles of Extensive Field Testing, Cummins Introduces Revolutionary Pump That Offers Advantages of Size, Simplicity and Serviceability.

units: *A gear pump* which draws fuel from the supply tank and delivers it under pressure through the pump and supply lines to the individual injectors. *The pressure regulator* which limits the pressure of the fuel to the injectors. *The throttle* which gives the operator control by changing the area available to the flow of fuel and, consequently, changes the pressure at the injector. *The governor* which controls idling speed and also limits the maximum speed of the engine and cuts the pressure in the manifold. *A shutdown valve* which cuts off flow of fuel to the engine. The fuel pump is coupled to the compressor or fuel pump drive which is driven from the engine gear train. The fuel pump main shaft turns at engine crankshaft speed and drives the gear pump, governor and tachometer shaft.

Located at the rear of the fuel pump, the *gear pump* is driven by the main shaft. This unit consists of a single set of gears to pick up and deliver fuel throughout the system. From the gear pump, fuel flows through a filter screen and to the *pressure regulator,* which is a by-pass valve to regulate the fuel—under pressure—supplied to the injectors. By-passed fuel flows back to the suction side of the gear pump. Fuel for the engine flows past the pressure regulator to the *throttle shaft.* Idle fuel passes around the shaft to the idle jet in the governor. For operation above idle, fuel passes through the throttling hole in the shaft and enters the governor through the primary jets. Mechanical governor action is provided by a system of springs and weights, and it has two functions. First, the governor maintains sufficient fuel for idling with the throttle control in idle position. Second, it cuts off fuel above maximum rated rpm.

The idle springs in the governor spring pack position the governor plunger so the idle fuel jet is opened enough to permit passage of fuel to maintain engine idle speed. During operation between idle and maximum speeds, fuel flows through the governor to the injectors in accord with the engine requirements as controlled by the throttle and limited by the pressure regulator. When the engine reaches governed speed, the governor weights move the governor plunger and fuel passages to the fuel supply manifold are shut off. In this manner engine speed is controlled and limited by the governor regardless of throttle position. Fuel leaving the governor travels through the shutdown valve, supply manifold and on into the injectors.

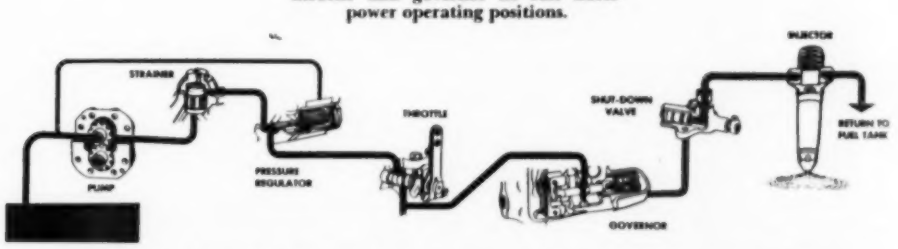
Fuel circulates through the injector at all times except during a short period following injection into the cylinder. From the inlet connection fuel flows down the inlet passage of the injector, around the injector plunger, between the body end and cup, up the drain passage to the drain connections and manifold and back to the supply tank. As the plunger comes up, the injector metering orifice is opened and fuel flows through this hole into the cup, at the same time fuel flows past the cup and out the drain orifice. The amount of fuel which enters the cup is controlled by the fuel pressure against the metering orifice. Fuel pressure is controlled by the fuel pump. The plunger during injection comes down until the metering orifice is closed and the fuel in the cup is injected into the cylinder. The drain orifice is always open.

In the supply line arrangement, the *shutdown valve,* used to shut down the engine, is located on top of the fuel pump. It is a "push-pull" type of valve: push in to start the engine and to permit fuel to flow to the injectors, and pull to shut off the fuel. For automotive type engines a solenoid motivates the shutdown. The ignition key actuates the solenoid to open and to hold the shutdown in the open position. From the *supply lines,* held to a specified size to insure an even pressure and supply of fuel from the pump to each injector, fuel enters the *inlet connection* to the injector. There are no check valves in the inlet connection used in the "PT" system. *Drain lines:* Not all the fuel entering the injector is burned in the cylinder. A set proportion circulates through the injector and is returned to the supply tank through the drain fittings, drain manifold and drain line. The drain lines are also held to a specified size to prevent restrictions on the injectors.

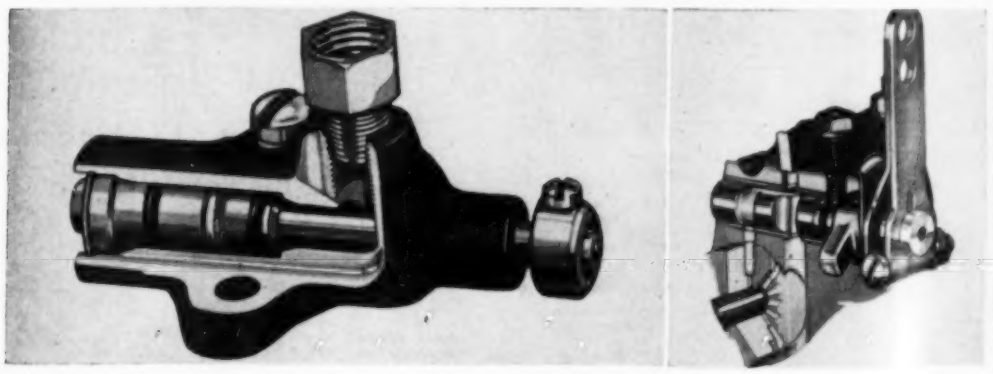
Comparison of "PT" Pump and Two of Its Predecessors

	Single Disc Pump	*Double Disc Pump*	*PT Pump*
Weight	104 lbs.	33 lbs.	13 lbs.
Total number of different parts	216	245	122
Number of parts	415	448	182
Bulk	100%	40%	12.5%

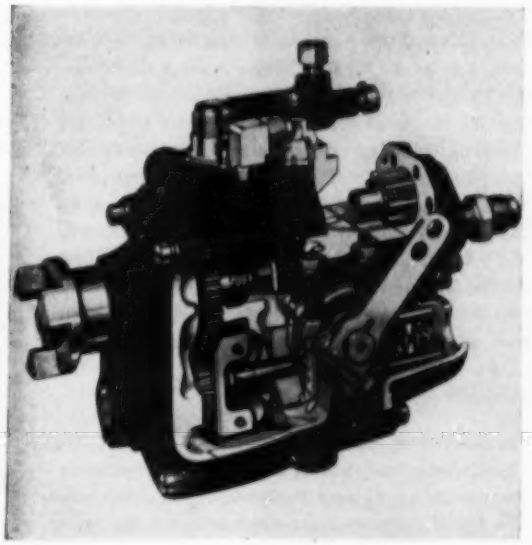
Diagram showing pressure regulator, throttle and governor in full horsepower operating positions.



Below, left: **The shut-down valve gives positive engine shut-down by cutting off completely the flow of fuel to injectors.** ***Right:*** **The throttle shaft gives instant response to demands for more power.**



Cutaway drawing of the PT fuel pump. The unit consists of the five simple assemblies shown in these photographs.



YOU TOO CAN USE HEAVY FUEL

THE use of residual fuels in place of #2 diesel fuel with diesel engines is quite a "hot" subject at the present time due to the possible economies in certain areas made feasible by substitution of residual for distillate. This can well be illustrated by the following tabulation of oil cost delivered to a certain Florida area in carload lots with these prices being quoted as of last year:

#2	$.1183 Per Gallon
#5	$.0868 Per Gallon
#6	$.0582 Per Gallon

From the above tabulation, it can be seen very readily that #6 oil in this particular locality is somewhat less than one-half as expensive per gallon as the #2 distillate. Thermally, there is very little difference in Btu. content between #2 and #6 and with proper purification equipment for the #6 oil and proper adjustment of the engine, there is no decrease in operating efficiency of the engine when running on the #6 over that obtained when operating on the light distillate. In most cases, the use of residual fuels involves some changes in the engine fuel system such as elimination of dead ends on the fuel inlet piping, shortening and lagging of lines, some adjustment to the injection equipment itself, a change in the engine cooling system so that necessary higher water jacket temperatures are maintained for the best efficiency.

In recent years, there has been a revival of interest in the use of residual oils in diesel engines. Most of the earlier engines burning this type of fuel were of the very slow speed type utilizing air injection. Today medium speed engines having operating speeds up to 500 rpm. and solid fuel injection are being converted because of the high economies possible due to the substitution of light distillate fuels. The savings in fuel are quite surprising and add up very rapidly. The City of Tarboro, North Carolina has the following engines installed: three 1760 hp. Worthington engines; two 900 hp. MacIntosh engines; one 1200 hp. Nordberg engine. The three Worthington engines are operated on a residual fuel of approximately #5 specifications made up of a blend of a #6 with a distillate. This oil had the following approximate specifications:

API Gravity 60°F.	15.5
Viscosity SSU at 100°F.	302
Carbon Residue	7.57%
Sulphur	2.3%
Ash	.02%

In an article in the magazine Public Works, August 1953, Mr. R. M. Weatherly, manager of the Municipal Light & Power System for Tarboro advised that for the fiscal year ending 30 June 1952, this plant was able to save $34,000.00 by use of the heavy fuel. For a total of 12,084,800 kwh. generated 705,039 gallons of #5 oil and approximately 146,257 gallons of #2 oil were used. Fuel cost per kwh. was 5.1 mills for the #5 and 8.5 mills for the same engine operated on #2. Thus the use of the heavy fuel oil resulted in a saving of 3.4 mills for each kwh. produced with the heavy fuel oil adding up to a total saving of $34,000.00 on the fuel bill for the year.

Clay Electric Co-op operates two plants in northern Florida with one plant at Keystone Heights having three 1450 hp. Cooper-Bessemer engines, and two 670 hp. Cooper-Bessemer engines operating on a #6 Mexican residual. At the Worthington Springs Plant, there are four 1645 hp. Cooper-Bessemer engines operating on this same residual oil. The plant at Keystone Heights has been successfully operated for about three years with Worthington Springs in operation for a year.

The Bryan Light & Water Works in Bryan, Ohio has some 9800 hp. of Nordberg engines installed and we understand are operating three engines totaling 6600 hp. on a #5 oil supplied by Standard Oil of Ohio. This oil is evidently of a very good quality having the following characteristics:

API Gravity at 60°F.	13.0
Flash	180°F.
BS&W	Trace
Pour Point	50°F.
Carbon Residue	5.12%
Viscosity SSU at 100°F.	275
Sulphur	.53% by weight

Centrifuging of this oil had the following results:

	Ash % by Wt.	*Water % by Wt.*
Original Oil	.014%	.05%
Centrifuged Oil	.006%	Trace

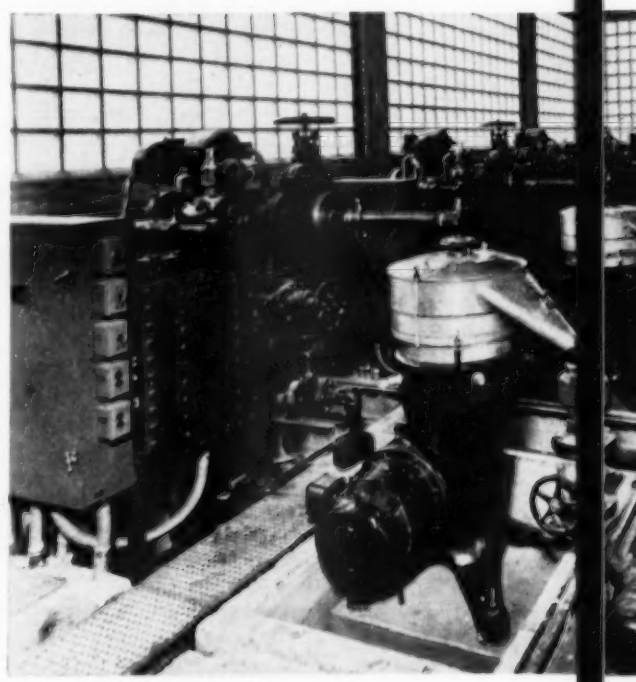
The Village of Freeport, Long Island, N. Y., has some seven diesel engines totaling 27,500 hp. burning a #4 fuel oil (Miranda Crude) and one 4350 hp. Baldwin-Lima-Hamilton engine which operates on #6 fuel oil. The #6 fuel oil that they use has the following characteristics:

API Gravity	12.4
Viscosity SSF at 122°F.	116.7
Flash Point	195°F.
Pour Point	25°F
Water and Sediment	0.3%
Sediment	0.16%
Carbon Residue	11.2%
Ash	0.147%
Sulphur	1.7%

This plant has a very complete heavy fuel oil system on the new Baldwin-Lima-Hamilton engine, which was engineered by Burns & McDonald, Consulting Engineers of Kansas City. Mr. William Tompkins is Chief Engineer.

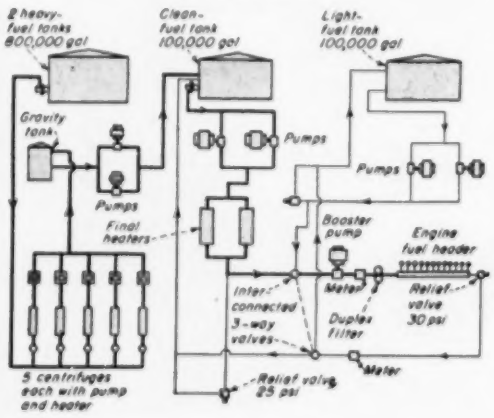
Nantucket Gas & Electric Company, Nantucket, Mass. has several 1000 hp. Cooper-Bessemer engines in operation on a #11 gas enrichment oil as furnished by Sun Oil Company. This is a selected residual fuel and has the following approximate characteristics:

API Gravity	16-19
Flash	150-204°F.
Viscosity SSF at 122°F.	148-150 (Max.)
Conradson Carbon	4.38-9% (Max.)
Ash Content	.09%-.1%
H_2O and Sediment	.3%-.5% (Max.)
Sulphur	.49-1.0% (Max.)

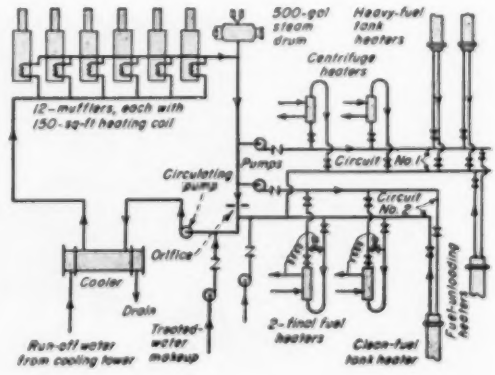


Five DeLaval centrifuges and a control board handle the fuel flow from tank cars to clean fuel supply at the Mexico City Tacubaya plant.

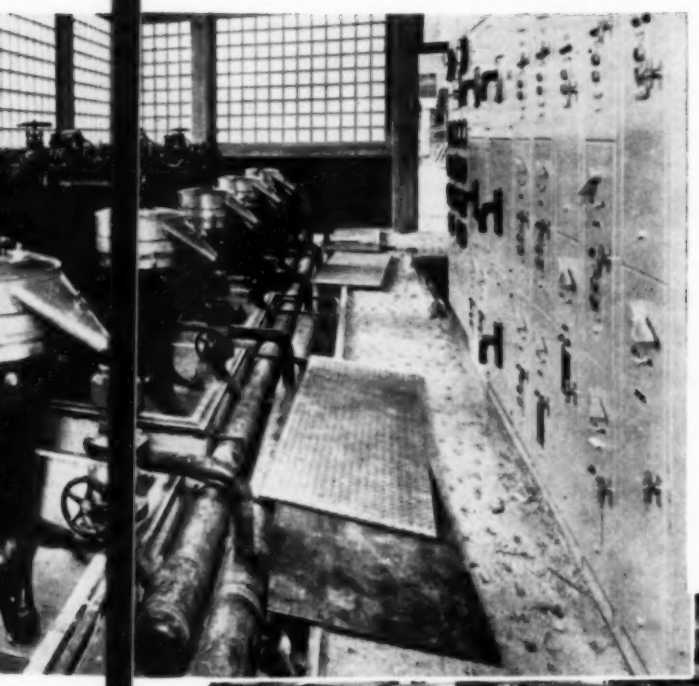
Tacubaya fuel oil system provides for heating and centrifuging fuel oil of bunker-C type. Light oil is used for starting engines.



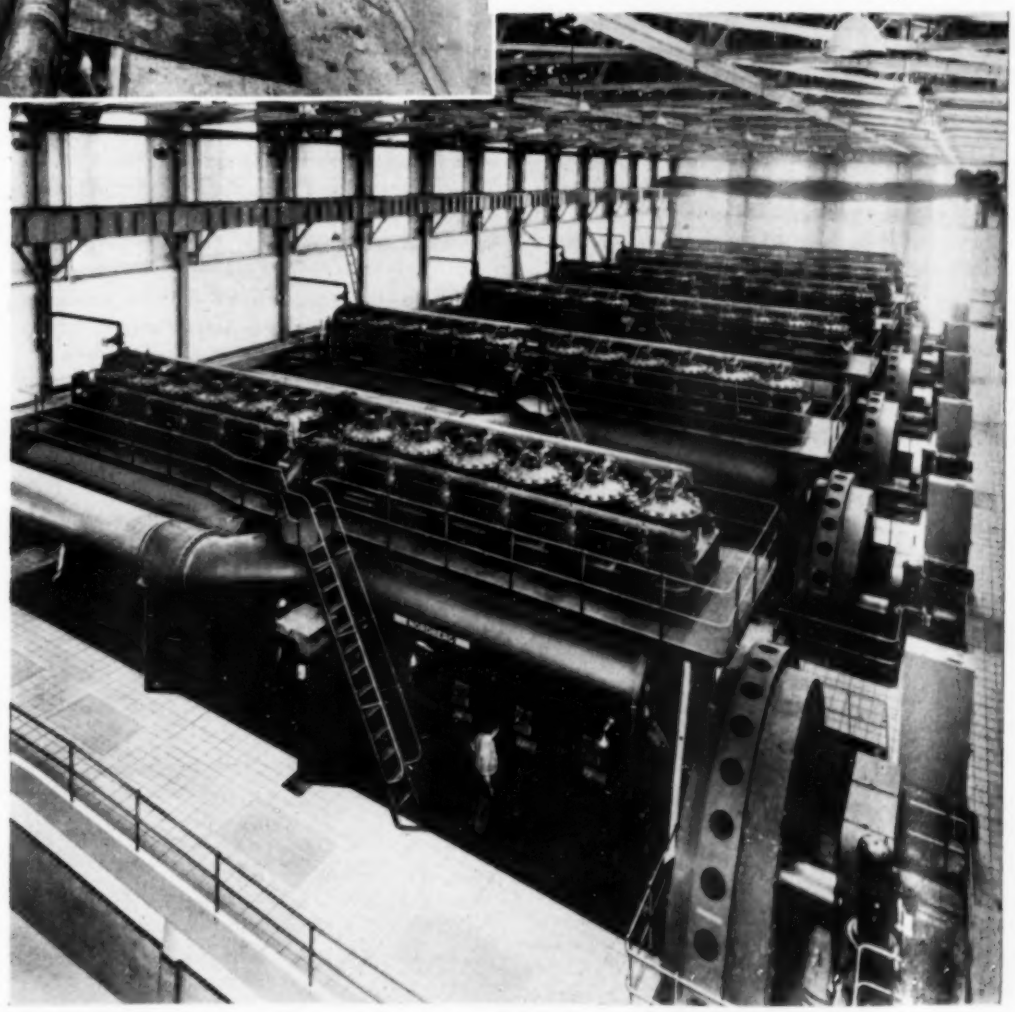
Tacubaya fuel-heating system operates under pressure. Exhaust heat raises temperature of water circulating in heaters at 240°F.



Fifth of a Series of Articles on the Successful Use of Heavy Fuel in Diesel Engines, Condensing Some Useful Facts on Successful Installations Supplied by D. M. Landis, DeLaval Separator Company



Six Nordberg 2-cycle, 12-cylinder, 29-in. by 40-in. diesel engines (30,000 kw. at 7450 ft. altitude) for Mexican plant.



Mr. George Longstreet is chief engineer of this plant and Mr. W. L. Mather is vice-president and general manager.

The City of Decatur, Indiana has recently installed a 6000 hp. Baldwin-Lima-Hamilton engine, which first was operated on a #5 oil supplied by an oil refining company of Rock Island, Illinois and was later to be operated on a #6 oil. An interesting side light of this installation is that at the time the centrifugal fuel oil purification equipment was purchased, no specification was available for either the #5 or #6. Based on specifications of similar #5 oil from other areas, a pair of moderate sized purifiers were furnished and when operated on this particular mid-continent residual oil, it was found that at capacities of only 150 gph. each, it was necessary to stop the machines and clean the bowls each 25 minutes. Complete specifications and samples of the #6 to be supplied were obtained and it was found that as much as 4% by volume of sediment would be centrifuged out.

As a result of this investigation, negotiations are being carried on at the present time toward installation of a continuous nozzle type centrifuge for purification of the residual fuels. This illustrates that there is considerable variation in the quality of the residual fuels from one area to another with varying amounts of BS&W in the oils depending upon the crudes, the refining process and even upon the method of transportation from the refinery to the ultimate user.

The Model AC-VO Nozzle-Matic special heavy fuel oil purifier has been very successfully applied to the problem of purification of #6 fuel oil. One of these units was supplied to Clay Electric Cooperative at Keystone Heights, Florida for a test period of operation. Here the machine was operated at the low capacity required for operation of this plant of approximately 125 gph. At this low capacity the machine reduced the ash content of the oil by as much as 61½% and at 125 gph. it removed from the oil some .204 pounds per hour of ash. Sodium content of the original oil was in the range of .0037 to .0046 and the clarified oil from the AC-VO contained approximately .0020.

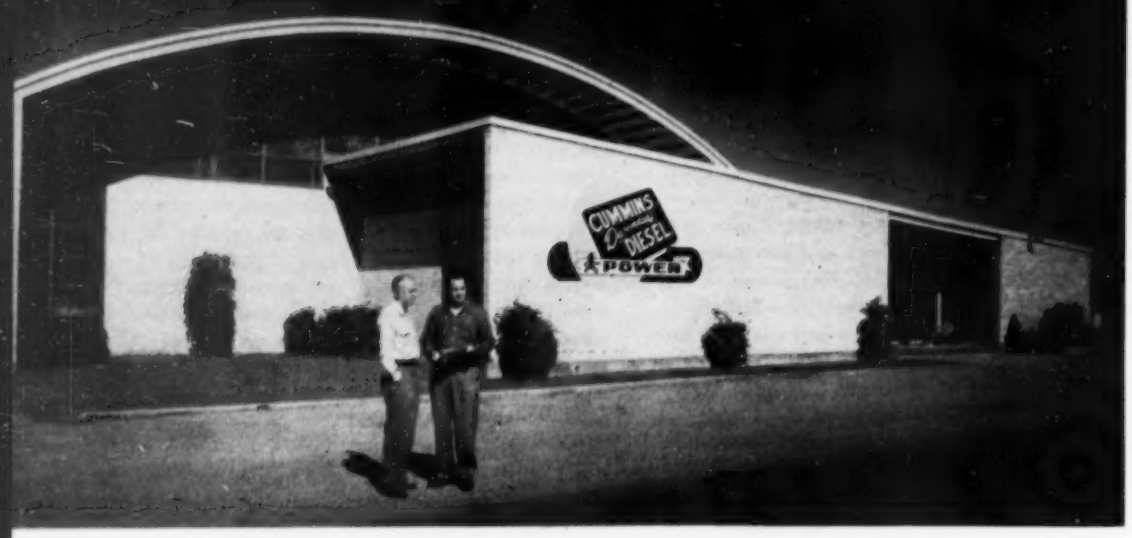
At the same time that the AC-VO machine was being tested at Clay Electric, one of our large Model 94 special heavy fuel oil purifiers was also tested. Although this machine did not give quite as good results as the AC-VO machine, the chief engineer, Mr. Robert J. Dodd, concluded that the Model 94 machine was the most practical for his particular plant because of the low requirements for purified fuel. Also during the midnight to 5:00 a.m. period, the power demand and fuel requirements dropped to but a fraction of the day time requirements and he did not consider a continuous machine as being necessary in this instance.

The plants listed below either have additional diesel engines on order which they intend to operate on residual fuels or very shortly they will place their order for equipment to be operated on residuals: Florida Keys Electric Cooperative; Tavernier and Marathon, Florida. At Tavernier the subject co-op has two 1450 hp. Superior engines and two 650 hp. Enterprise engines. At Marathon two new Superior engines capable of developing from 1000-1250 kw. each are being installed at the present time. These units are to be operated first on a #5 oil—Belcher gas enrichment oil and then on a #6 oil. Two of our model 94-21 heavy fuel oil purifiers have been furnished. Mr. William B. Nicholls is chief engineer for both of these plants.

City of Vero Beach, Vero Beach, Florida. This plant has one Nordberg and two MacIntosh engines totaling 2470 hp. and has recently installed two additional Nordberg engines; one 4500 hp. and the other 4050 hp., which are to be operated on #6 fuel oil after a preliminary period on #2 and then on #5 gas enrichment oil. As oil purification equipment, we have recently furnished two of our model 94 special heavy fuel oil purifiers. The chief engineer for this plant is Mr. Fred Gossett.

Kissimmee Muncipal Power Plant, Kissimmee, Florida. This plant had four diesel engines, two Fultons and two American Locomotive. In addition they are installing at the present time two 2100 hp. Fairbanks-Morse, which are to be operated on #6 fuel oil. Two of our model 94-21 heavy fuel oil purifiers have been supplied. Mr. Ray Henschel is chief engineer of this plant with Mr. A. P. Michaels of Michaels & Sons, Orlando, Florida being the consulting engineers.

In the May issue of DIESEL PROGRESS the Tacubaya, Mexico plant was illustrated as a part of the first of these articles on heavy fuel. This is one of the most important and one of the largest plants on this continent using heavy fuel consistently and efficiently. See illustrations on these two pages.



DIESEL TEAM BUILDING ARIZONA

Cummins & Moran Are Re-powering Copper State's Mines, Highway Transportation, Road Building, Irrigation Systems and Industry

By F. HAL HIGGINS

ARIZONA is rolling toward its destiny as one of the great states in production and population. Only the question of how soon the Copper State will get the water that will grow the crops and support another 70,000,000 workers and vacationists can check its speed to those high goals.

Today, engineering and population are combining to demand the year-round farming system that is coming as fast as the desert gets water. In the past quarter of a century have come such accomplishments as the All-American Canal, the Los Angeles aqueduct, the harnessing of the Columbia in the Northwest and the Sacramento and San Joaquin rivers in California's great Central Valley. The waiting deserts of Arizona, southern California and perhaps New Mexico are next.

Population and industry are taking up present Arizona farming lands so fast that agriculture is being forced out into the hills and desert to reclaim land for new farms. The year-round farming of the area will support a huge population as soon as the water is brought in, and right in the path of destiny, as engineers ponder the water problem, is a team of diesel dealers worthy of attention. They have been busy re-powering the copper, zinc and lead mines, the long-haul freighting by trucks and the heavy construction of roads, irrigation systems and desert reclamation for farming and industry.

On arrival in Phoenix during a recent trip into Arizona, the writer called Deloss Cummins of the state's dealership for the Cummins engine and parts line and received an invitation to ride along with him for a couple of days covering the great copper mining operations, where the introduction of dieselized motor trucks in open-pit or strip mining has cut costs of moving overburden and ore so sharply that copper ore as low as .75% is now practical. The government has taken a long-sighted approach to the nation's mining industry and has made long-term contracts with the big mining companies to make profitable the mining and stockpiling of copper, zinc, lead and other essential metals against future needs in war or peace. The high-speed diesel engine is giving the national economy a double dividend: It is helping to keep the mining industry in a healthy, going state with good wages and modern equipment, and it helps the country remain independent of foreign supplies of strategic ores.

The Moran end of the dealership team was absent, but the visitor gained a valuable lesson on the dieselization of strip mines from the younger brother of the man whose name is stamped on a big share of the high-speed diesel engines powering the nation's long-haul freight trucks. Deloss Cummins said mining and construction sales comprise 45 to 50% of Cummins & Moran business in the territory. Road transportation for the big long-haul trucks gets most of the remainder. This factory-trained partner with the family name that goes with the engine and service he sells is keen on the manner of training dealer service men to meet his standards of efficiency. "At present there is a school set up at the factory with periodical classes for service managers and mechanics," Deloss Cummins explained. "Another school at Columbus, Ind., is operated for owners' or operators' mechanics." Thus dealers and owners get sound schooling at the factory where both benefit from bringing together the men who own and operate the high-speed Cummins diesels. "In our own shops we run an apprentice program for the training of mechanics. These boys attend night school twice a week. The program in our shop is based on a 4-year period, after which the student graduates as a journeyman, or first-class diesel mechanic."

We saw most of the big-name copper strip-mining jobs in our 2-day drive east from Phoenix to Inspiration, down through Tucson to Bisbee and Douglas on the Mexican border. We met everybody —top managers, shop service mechanics, truck operators. Dart, Euclid and GMC trucks are fighting it out for the heavy job of moving 25 to 50-ton loads of ore up out of the pits around circling, climbing roads to the dumps. International, Mack and White trucks were seen at other mines. The torque converters have proved their place in increasing tire life and lengthening the time between overhauls. Both Twin-Disc and Allison torque converters are well established and being made standard equipment. The Isbells of Reno did a real job in testing torque converters to prove their economy in strip mining in Arizona two years ago.

It was an education to watch as Deloss Cummins contacted the mining personnel where his engines were working. Here is often the key to dealer success in selling big companies with headquarters in New York and government contracts in which the local mine management is trained to observe regulations and instructions to the letter. The visiting dealer knew his companies and their personnel, from managers to shop superintendents, and his welcome was genuine. He was alert to adjusting and changing conditions at each mine and was ready with sympathetic, comprehensive questions about old problems that had been solved and new problems that might have appeared. He was welcome in a place where every machine and every man is judged on performance. Mr. Cummins was helpful in his briefing of shop and service men on downhill speeds, dumping procedures and pointers for protecting engine gear cases and bell housings.

How was this Arizona dealership put together? What did it require in background, training and know-how? Deloss Cummins was with the Cummins Engine Co., Inc., from 1916 to September of 1945. In this time he was in manufacturing, sales and service and was general service manager for a num-

ber of years, the position he held when he left the company. R. G. Moran, a resident of Arizona for 25 years, sold agricultural machinery for several years, and then went to the Caterpillar dealership for three years. He left Caterpillar to manage the dealership in Phoenix for Watson & Meehan of San Francisco. He left this position to form the partnership of Cummins & Moran on September 1, 1945.

Mr. Moran, long familiar with mining, sold the first Cummins in Arizona's great mining industry.

As Deloss Cummins puts it, "I would say the reasons we chose this territory were these. First, the availability of the territory, which was formerly owned by Watson & Meehan. Both Moran and I were familiar with it. We surveyed the field and were sold on the idea that the mining industry in this section was due for considerable growth, and we felt that the trucking industry was in its infancy, as far as its possibilities were concerned. It also had a healthy engine population which, by the care that could be given by a small dealership, could be made to grow and expand.

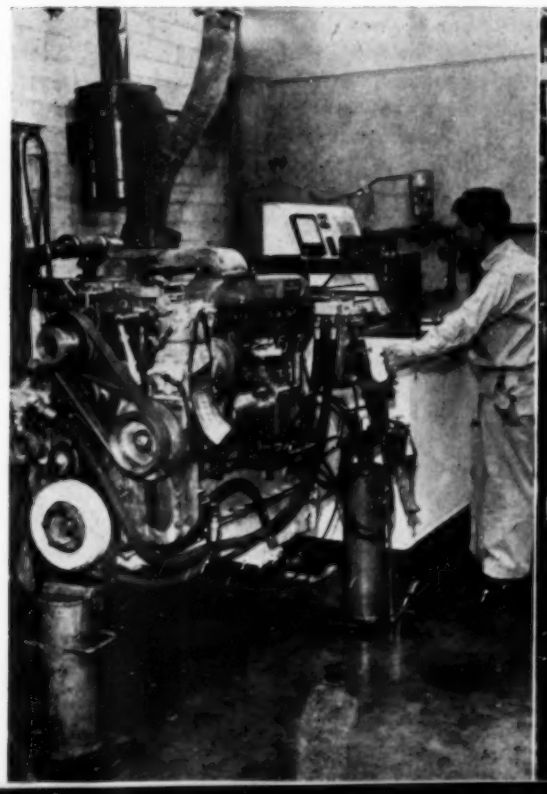
"Eight years ago there were four or five companies strip mining in Arizona. Some of these major companies were operating by rail and truck, others were stripping in conjunction with underground mining, while one or two were 100% stripping by truck. This has seen considerable change in the last five years with the majority of the mines changing over to strip mining entirely. This has been brought about because the higher grades of ore have been exhausted, making it necessary to use lower grades which can be mined cheaply by strip mining," Mr. Cummins continued. "The Cummins Engine Co. had had considerable experience in strip mining, both in the Iron Range and in the coal fields, as well as some in Arizona. This experience had been satisfactory, so it was only natural that it expanded the use of Cummins diesel engines. Also, the majority of the manufacturers who built heavy dirt-moving equipment used Cummins diesel engines as standard equipment."

Panoramic view of the open pit operation of the Inspiration Copper Corporation in Arizona. Diesels provide the economical means of digging out and moving the ore.

Mr. Cummins pointed out that some problems differed in strip mining from the Iron Range, with its extremely low winter temperatures, and in Arizona with its 120-degree summer heat. Many changes were needed to adapt Cummins diesels to the copper mining industry, and the engine company helped solve the problems as they were presented. Test projects were initiated by the engine firm with the help of the mining companies.

Some of the mines maintain their own rebuilding facilities, but a considerable number depend on Cummins & Moran for engine rebuilds. These companies remove the engines from the chassis and ship them to the shop in Phoenix for rebuilding. "One of the major Mexican operations handles its engines on a unit rebuild plan, shipping to our shop the fuel pumps, cylinder heads and various other accessories which we rebuild and return," Mr. Cummins explains. "These units are placed in their stock and when an engine is rebuilt the old engine is torn down, cleaned up and completely rebuilt with units that have been repaired from their stock. This gives a short downtime for engines because they can be quickly rebuilt and still receive the advantage of properly rebuilt units. Our shop is completely equipped to rebuild all the units on all engines by factory recommended tools and to factory limits." Cummins & Moran also maintain an outside service man. This man is also capable of instructing shop personnel in the care and maintenance of Cummins diesels. Many companies send in their own maintenance personnel to Cummins & Moran for instruction.

A diesel engine on the dynamometer in Cummins & Moran large and efficient plant.



View of the interior of the repair department in the Cummins & Moran plant. Equipped to keep diesels operating at peak efficiency, shops such as this have helped build the diesel's reputation for high dependability.

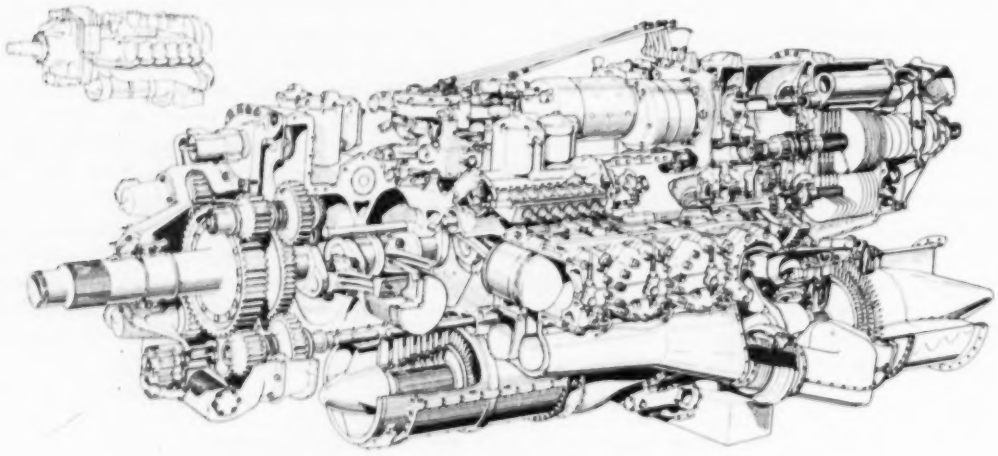
WHAT'S GOING ON IN ENGLAND

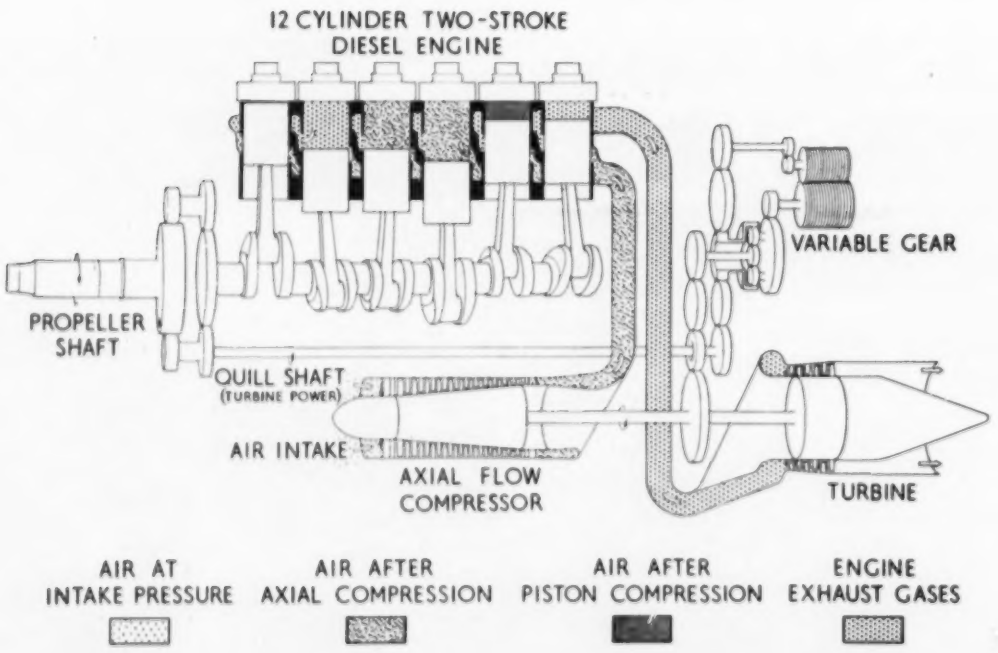
CONDUCTED BY **HAMISH FERGUSON**

Hamish Ferguson received his training and early experience with the English Electric Company. Subsequently, he spent a number of years with a firm of diesel engine consultants, London, and in 1944 became secretary to the Diesel Engine Users Association. In 1953, he relinquished his appointment to devote his time to private consulting work connected with diesels and gas turbines.

NAPIER NOMAD

DURING 50 years of development the aircraft engine has made enormous strides in respect of specific output and reduction in power/weight ratio. Yet, surprisingly enough, the improvement of the thermal efficiency of the engine cycle is negligible where piston engines are concerned and as for straight jet engines, fuel consumption is prodigal. Where speed is a main consideration, the burning to waste of a great deal of fuel is inclined to be regarded as inevitable, but we are now entering an era during which there will surely be a vast increase in air freighter services and the whole economics of air transport will have to be reviewed in the light of international competition. The service which can offer the cheapest rates, at the same time maintaining a reasonably fast schedule with long operating range, will show to great advantage—and these objectives can only be achieved by improving the efficiency of the engine.





D. Napier & Son Ltd. of Acton, London has tackled the problem of producing a really lightweight and economical power unit by designing a compound engine consisting of a 2-stroke diesel engine and a gas turbine harmoniously coupled together in such a way that the best features of each type of prime mover are utilized to the fullest advantage. The result of several years of development work is a combined engine which produces 3135 effective horsepower at sea level and shows a fuel consumption when cruising at 25,000 feet of only 0.327 lbs./ehp. hr. The specific weight of the engine is only 1.17 lbs. per hp. and it will run on a wide range of fuels including diesel fuel, for which it was primarily designed, kerosene and wide-cut gasoline.

The mechanical layout of the Nomad engine comprises two main components, the diesel engine and the turbo-compressor set, which are connected by a gear train incorporating an "infinitely variable" gear. This arrangement enables the selected boost to be maintained over a wide range of altitudes.

The diesel engine is a 12-cylinder horizontally-opposed unit operating on the 2-stroke cycle, the cylinder bore and stroke being 6 in. and 7⅜ in., respectively, giving a total displacement of 41.1 liters and a maximum speed of 2050 rpm. The crankcase is of magnesium-zirconium alloy and is split on its vertical center-line to permit assembly of the 6-throw nitrided steel crankshaft which is carried in thin-wall bearings of lead-bronze type. The two cylinder blocks are aluminum-alloy castings and contain water-jackets for cylinder cooling. The dry cylinder liners, which are of copper-chromium alloy, contain the inlet and exhaust ports which are piston operated. The combustion chamber is formed in the cylinder head and is hemispherical in shape, having a centrally situated fuel injector. The injection pumps are of "jerk-type" design, specially developed for operating at high speeds and specific outputs.

The pistons are of 2-piece construction, comprising a Y alloy body with an upper portion in austenitic steel, which permits the latter to run at tempera-

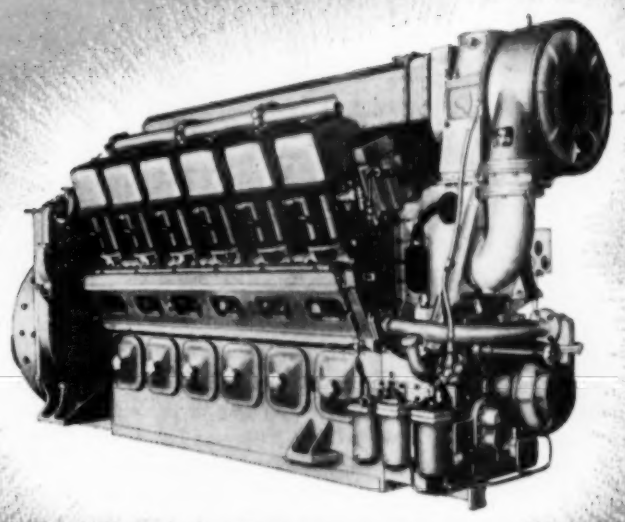
SPECIFICATIONS

Sizes: 12- or 16-cylinder • Bore: 9" • Stroke: 10½"
Cycles: 4, turbocharged
Horsepower: from 1100 at 720 rpm to 2040 at 1000 rpm
Net weights (engine only):
12-cylinder: 31,365 lb dry, 32,965 lb wet
16-cylinder: 37,000 lb dry, 38,996 lb wet

TYPICAL APPLICATIONS

Crude Oil Pipeline Pumping
Products Pipeline Pumping
Electric Power Generation
Irrigation Pumping
Dredging
Portable Units Mounted on Skids

the ALCO heavy-duty, lightweight



9" x 10½" engine for continuous or stand-by service in stationary or portable installations!

Here's the diesel engine you've been waiting for—the latest addition to a line long famous in every quarter of the globe.

It's the heavy-duty, lightweight 9" x 10½" ALCO . . . a single source of low-cost, dependable power for a wide range of applications—continuous or stand-by, stationary or portable.

Look at the partial list of specifications, applications and special features above and at right. See if you don't agree that the all-purpose Alco is the answer to your toughest, costliest diesel-engine problems.

For more information fill out and mail attached coupon. We'll send you promptly a free copy of our Bulletin DE-4, giving complete details.

ALCO DIESELS
AMERICAN LOCOMOTIVE COMPANY
Sales and Service Offices in Principal Cities

SPECIAL FEATURES

Engine base and frame of structural steel—for light weight, greater strength, more economical foundations.
Compact design—saves floor space.
All wearing parts easily accessible for maintenance.
Lube-oil sump, circulating-water pump, and lube-oil pump are integral parts of engine—thus reducing installation costs.
Air-motor engine starting, using as low as 60 lb air.
Turning gear—built into engine for use with commercial air motor.
Free end of engine has extension shaft for driving auxiliaries (fan compressor, etc.).

AMERICAN LOCOMOTIVE COMPANY
Schenectady 5, N. Y.

Gentlemen:
Please send me a copy of your Bulletin DE-4 giving complete details on the heavy-duty, lightweight ALCO diesel engine.

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tures of upwards of 600°C. at the center of the crown at full power. Cooling oil, pressure fed from the crankshaft system through drillings in the connecting rod, is provided and is directed particularly at the region behind the piston gas rings to insure that the ring temperature is reduced to a satisfactory working level. Big end and small end bearings are of the half-bearing or "slipper" type, with straps fitted as safety devices to deal with the light loads in the reserve loading direction.

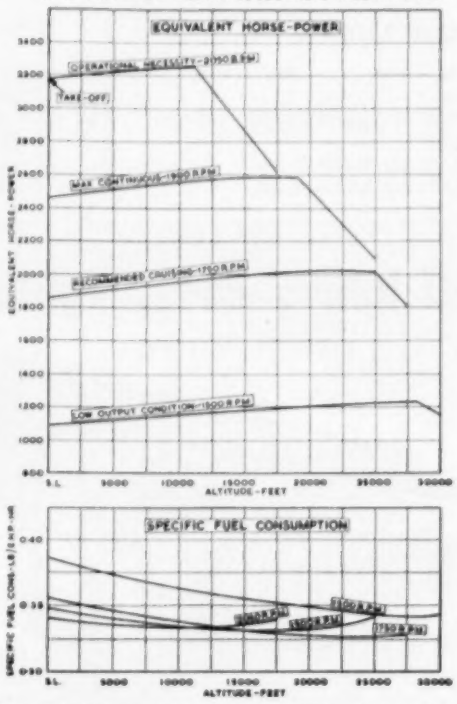
The axial-flow compressor is suspended by four flexible links below the crankcase, and its entry is arranged to take full advantage of "ram" air. It has 12 stages and a maximum pressure ratio of 8¼:1 with an air mass flow of 13 lbs. per second. Adjustable inlet guide vanes are employed to extend the operating range of the compressor at low speeds to match the requirements of the turbine, and these are automatically controlled. The rotor and stator blades of the first five stages are steel, the remaining stages being aluminum-bronze.

The turbine, which is mounted co-axially with the compressor, has three stages and is designed to extract the maximum energy from the gases. Thus there is only a small amount of residual thrust. The rear gear casing is machined from a magnesium-zirconium casting and contains the main portion of the reduction gear train between the turbine and the diesel engine. In addition, it houses the oil sump, the oil pressure and scavenge pumps and the coolant pumps, and contains drives for the engine starter and auxiliary gearbox.

NAPIER "NOMAD 2" ENGINE
(DEVELOPMENT STAGE N.No 6)

PERFORMANCE CURVES

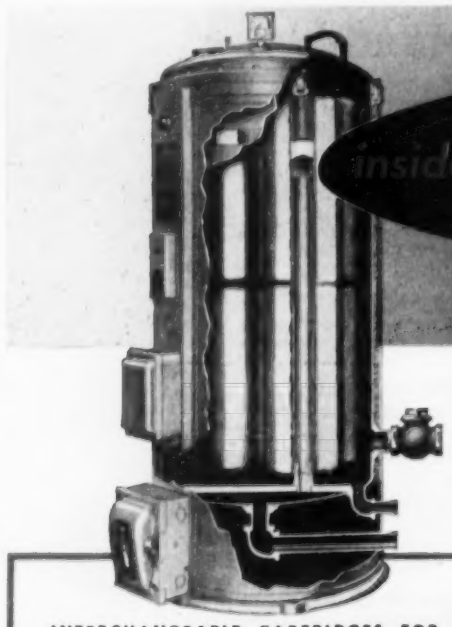
I.C.A.N. STANDARD ATMOSPHERE; 300 KNOTS TRUE AIR SPEED



The infinitely variable gear is contained in a housing which is attached to the rear face of the rear gear casing above the turbine. This gear has been designed and developed by Napiers to suit the particular requirements of the Nomad application but the basic scheme was evolved by Dr. Josef Beier and developed in Germany before the last war. It is an ingenious, practical adaptation of the well known scheme in which two conical members are end loaded together, the gear ratio being varied by sliding one cone over the other.

Each planetary shaft swings around a fulcrum to obtain changes in gear ratio, and by attaching a gear to the planetary shaft meshing with one at the fulcrum it is possible to arrange a constant mesh gear system so that changes in gear ratio can be made while running. In operation the gear is lubricated by high-pressure oil directed at the contact points between each flanged and coned disc. This prevents metallic contact between them—the power being transmitted through the drag force obtained by fluid shear of the oil film. The speed reducing gear between the turbo-compressor set is of epicyclic form, the variable speed device being connected across two members of the epicyclic train.

Engine Controls. The engine is fitted with a single lever control system which relates to the speed, boost and fuel functions together to insure that a predetermined operating line is followed. The speed control is provided by a mechanically set constant speed unit varying the propeller pitch. For each speed selected there is a fixed value for boost pressure and for fuel flow. The boost pressure obtained is applied to a normal type of variable datum boost control unit, the servo piston of which is connected by linkage with the control setting of the variable gear.



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The Honan-Crane "Multi-Cartridge" Purifier is engineered, inside and out, to provide the high-flow, *thorough* oil purification essential for diesels. Removes *all types* of harmful contamination . . . substantially reduces engine wear and maintenance costs . . . quickly pays for itself in oil savings alone!

Here are a few of the time-tested features that make Honan-Crane *preferred for safety and savings* wherever diesels are used » »

1. Cartridges are readily interchangeable to provide type and degree of purification required.
2. Clean oil is drawn from top of purifier. Maximum efficiency of each cartridge is utilized.
3. Cartridge design prevents channeling or by-passing. Multiple units provide high flow rate.
4. Electric heater bands maintain correct oil temperature. Steam, hot water heating available.
5. Oil-and-gas-tight seals and gaskets prevent seepage. Dirty oil cannot contaminate clean oil.
6. Double-decked cartridges save floor space, permit clean design, greater operating efficiency.
7. Positive locks and pressure springs keep cartridges securely in place, prevent by-passing.
8. Purifier is fully equipped with automatic controls and safety features. Requires no attention.

INTERCHANGEABLE CARTRIDGES FOR HONAN-CRANE PURIFIER

TYPE "MC"—Cotton bag packed with Cranite (fuller's earth). Removes solids and products of oxidation . . . acids, gum, etc. Provides refinery-type purification.

TYPE "MF"—Perforated metal basket packed with Palconia (cellulose fiber). Recommended for additive oils for complete removal of dirt, scale and other solids.

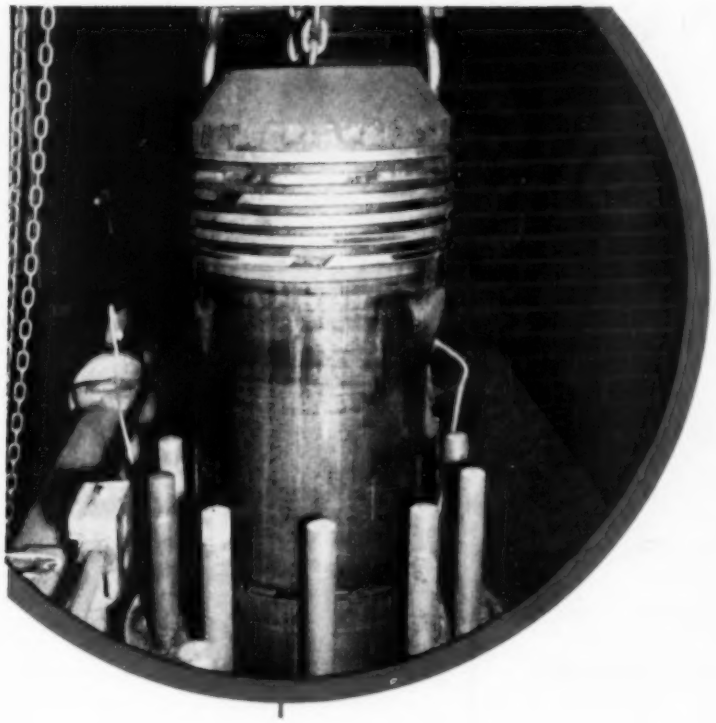
TYPE "S"—Contains Palconia (cellulose fiber). Performs same as Type "MF." Fiber center-tube permits complete disposal of spent cartridge by burning.

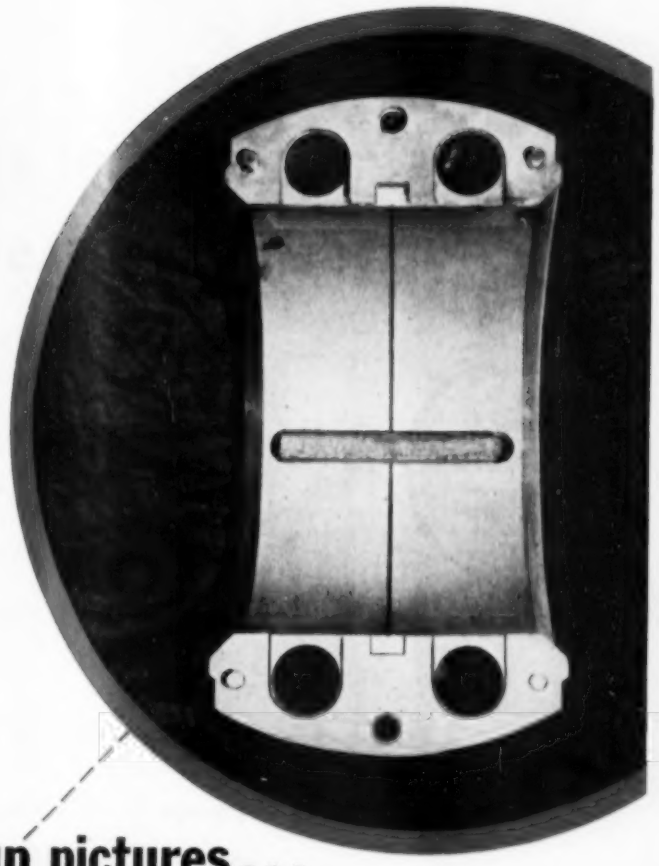
TYPE "E"—Similar to Type "S" except that filtering material is cotton waste and excelsior. Type "E" is recommended when water is encountered in the oil.

WRITE US ABOUT YOUR OIL PURIFICATION PROBLEM

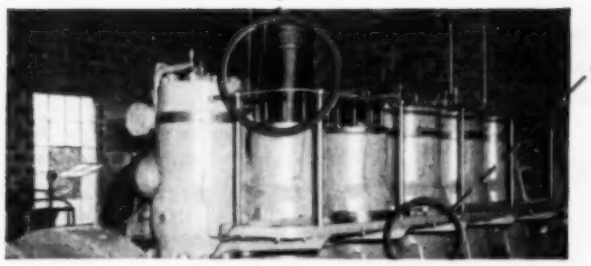
Honan-Crane Fuel and Lube Oil Purifiers are available for any size or make of Diesel Engine. For detailed information, write Honan-Crane giving make, model and H.P. of your diesel. Describe any unusual aspects of your oil purification problem.

HONAN-CRANE CORPORATION
202 Indianapolis Avenue, Lebanon, Indiana
A Subsidiary of
HOUDAILLE-HERSHEY CORP.





the proof is in these close-up pictures . . .



Piston and bearings are removed from this diesel unit. Closeups show how STANDARD HD Oil kept these vital parts free of carbon and varnish deposits.

taken after 10,500 hours of operation!

A few years ago the Village of Halstad, Minnesota, was up against a serious power problem caused by engine deposits. Power was urgently needed and engines could not be taken off the line for cleaning. STANDARD HD Oil was installed. It performed an outstanding rescue job just when the engines were operating at their worst. Rings became free, deposits were eliminated, the engine began producing at rated capacity—all without any interruption of service.

Naturally plant operators insisted on STANDARD HD Oil when they installed their new 6-cylinder engine. Here too, STANDARD HD Oil has meant savings in time and money. Recently, after 10,500 hours of operation, without overhaul, the new engine was disassembled for routine inspection. Pictures above show that all bearings, pins and rings were found to be as good as new.

Standard Oil lubrication specialist W. G. Waller (right) answers lubrication questions for Halstad power plant operators. There's an experienced specialist near you who can answer *your* questions. Call your nearest Standard office or write to Standard Oil, Chicago.

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OIL

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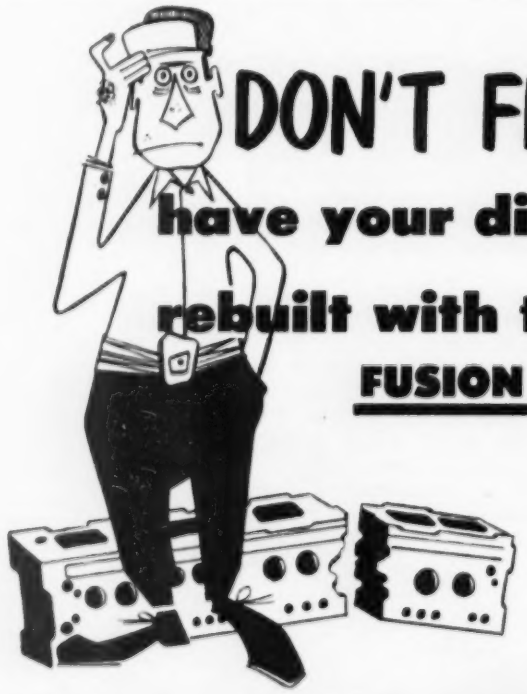

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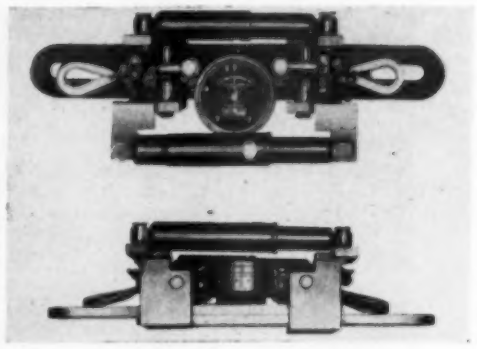
Locomotive Traction Test



Proof that horsepower, rather than locomotive dead weight, is the important factor in mine haulage has been established with the use of a Dillon dynamometer by the Ruth Co. of Denver, diesel mine locomotive manufacturer. In this test it was shown that the same tractive power necessary for hauling nine 3600-lb. Granby ore cars was obtainable from a redesigned locomotive of only 10,000 lbs. dead weight, compared to older style locomotives of 20,000 lbs., the same horsepower.

As shown in the accompanying photograph, the dynamometer has been equipped with cable-type connectors at each end and has been fitted into a special sliding yoke assembly. Hydraulic shock absorbers are affixed to opposite sides of the yoke so shock loading or tests on rough track will not injure calibration of the instrument. By using this special dynamometer draw-bar test arrangement, it was revealed that the newly designed locomotive had fully as much traction needed to pull the load as the old style, and with only half the dead weight.

The savings, by eliminating 10,000 lbs. of dead weight on a mine locomotive in acceleration, track maintenance and curvature upkeep, is hard to calculate accurately, but it is apparent in over-all costs. This simple traction test with a Dillon dynamometer is applicable to any type of powered vehicle where draw-bar pulling power must be determined. For further information, write DIESEL PROGRESS, File No. 116, Box 8458, Cole Station, Los Angeles 46, Calif.

Executive Engineer Retires

F. G. Shoemaker

F. Glen Shoemaker, executive engineer of the Detroit Diesel Engine Division of General Motors, has retired after 25 years of association with the GM diesel engine. Mr. Shoemaker joined GM in 1928 when the corporation's diesel program was initiated and was first associated with the design of GM's large 2-cycle type diesel. He later was in charge of designing the smaller series 71 diesels manufactured since 1937 by the division. Following his graduation from the University of Illinois in 1914, Mr. Shoemaker served as an Army instructor in aeronautics during World War I. He is a member of the Society of Automotive Engineers and is a widely recognized authority on diesel engines and allied engineering subjects.

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Pressure, vacuum or electric driven, conserve power under all operating conditions.

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Protects coil sections from falling objects; standard equipment on Units without shutters.

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Includes squirrel cage; 3 phase, 60 cycle, at 220 V. Totally enclosed fan-cooled motors for belt driven Units.

STANDARD V-BELT
Standard sizes of V-type belts are used for motors or engine power take-off.

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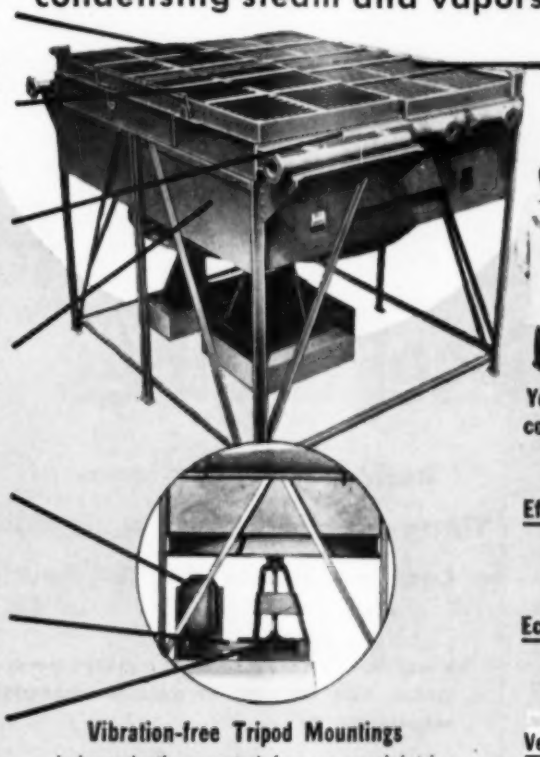
Standard sizes of 3 to 10 groove V-sheave pulleys are used depending upon operating requirements.



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Independently mounted fans on special tripods completely eliminate fan vibration, a major cause of core failures.

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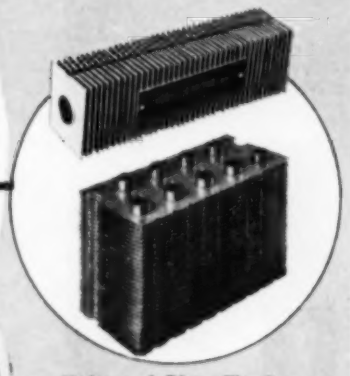
Provides economical replaceable tube feature. Available in copper, brass and admiralty metals.



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Coils supplied for any operating pressure. Available in plate fin, monofin or spiral fin construction.

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Efficiency of vertical air discharge

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*For other representatives see the yellow pages of your telephone book.

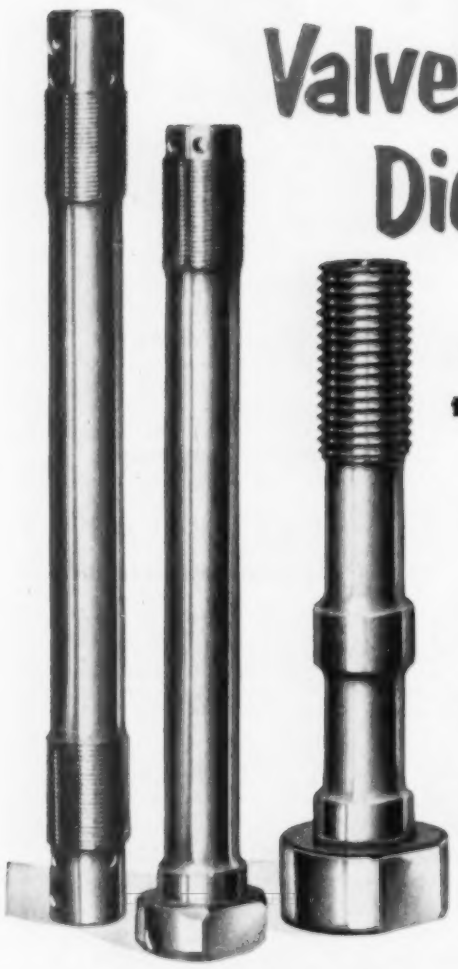
Socketless Fittings, Hose Kit

Aeroquip Corp. of Jackson, Mich., producer of flexible hose lines for industry, announces a new socketless fittings and hose kit. Marking the initial entry of Aeroquip into the automotive field, the socketless fitting kits will be made available to service stations, garages, automobile dealers, truck, bus and taxi fleet operators, construction firms and industrial and mill supply houses through automotive and industrial distributors. This fitting and hose combination requires no clamps or sockets. The hose is pushed on the fitting and the effect of pressure makes an even tighter grip.

The fittings and hose are available in ¼-in. and ⅜-in. sizes in the kit and to ⅝-in. in bulk stocks. The merchandiser shown here includes 17 popular fitting sizes and 24 ft. each of hose in both the ¼ and ⅜-in. sizes. Aeroquip believes a real advantage to automotive service businesses will be reductions in inventory made possible by dispensing with costly stocks of ready-made hose lines. The socketless fittings and hose may be used for low and medium pressure fuel, air, water and oil lines.

Eaton

Valves and Bolts for Diesel Engines



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- **Years of forging experience, plus the most modern forging equipment**
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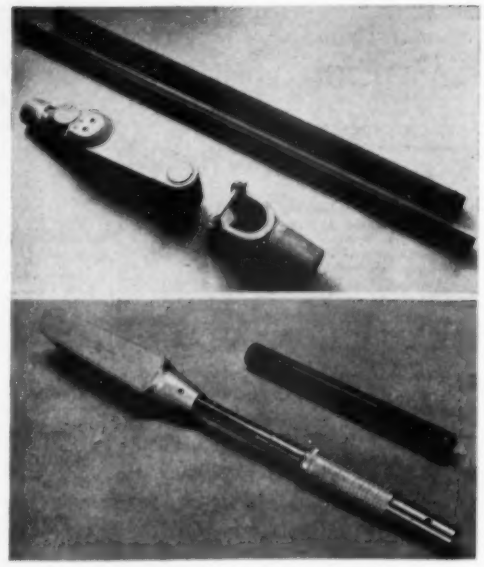
PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings Springlites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

New Torque Limiting Wrenches



JOMI 1202 *(top)* and JOMI 4800.

Jo-Line Tools, Inc. of South Gate, Calif., has added two new models—the JOMI 4800 and the JOMI 1202—to its line of precision torque limiting wrenches. These precision hand tools, featuring accuracy and automatic torque protection, are used wherever control of the torque applied to threaded fasteners is required.

The JOMI 4800, with a range of 1200 to 4800 inch pounds, expands the company line to include diameters up to one inch. The unit consists of a chromium-plated steel barrel with an aluminum head and handhold. The head contains the torque sensing mechanism. The torque setting is indicated on vernier calibrations similar to those found on micrometers, and a positive lock prevents accidental alteration of the setting while the wrench is in use. It is adjustable in increments of 10 inch pounds.

Addition of the JOMI 1202, with its range of 300 to 2000 foot pounds, expands the line to include thread sizes of from No. 4 through two inches. The unit consists of the torque head, two handles and a tee adapter, which permits 2-man operation of the tool at high torque settings. The setting on the JOMI 1202 is accomplished by turning an adjustment knob while the torque setting, in foot pounds, is shown through a small window. When the torque applied to the work is equal to the torque setting, the wrench releases. The unit is adjustable in increments of 50 foot pounds.

For additional information on these new models, write William S. Woods, Jo-Line Tools, Inc., 8442 Otis St., South Gate 26, Calif.

Cooper-Bessemer Offers Bulletin

A new engineering bulletin describing its latest type JS engines has been released by Cooper-Bessemer Corp., Mount Vernon, Ohio. Bulletin J-73 provides specifications and descriptions on the complete line of 13-in. bore and 16-in. stroke diesel, gas-diesel and spark-ignited gas engines built by the firm. Cut-away drawings showing engine details and performance charts are also included in Bulletin J-73, available by writing to Cooper-Bessemer.

How much **of your engine maintenance bill is due to repair of breakdowns that could have been avoided—*if you'd had advance warning?***

At a fraction of that cost, Alnor Exhaust Pyrometers offer you a constant check of engine performance—advance warning of

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Get the best from your diesel—minimum fuel consumption per horsepower and long service uninterrupted by foreseeable breakdowns. Get constant protection of your engine, cylinder by cylinder, with an Alnor engineered Exhaust Pyrometer System.

Get Full information—Quickly! **Your nearby Alnor Diesel specialist is conveniently listed in the classified directory. Ask him to help you select the Pyrometer and thermocouple assembly designed for your engine. Or send for Bulletin 4361 with complete details of the full Alnor line of Pyrometers.**

Every Diesel Deserves Alnor Protection.

Alnor

Man knows only that which he can measure

ILLINOIS TESTING LABORATORIES, INC.
Room 508, 420 N. La Salle St.,
Chicago 10, Illinois

New Quincy Dual Control

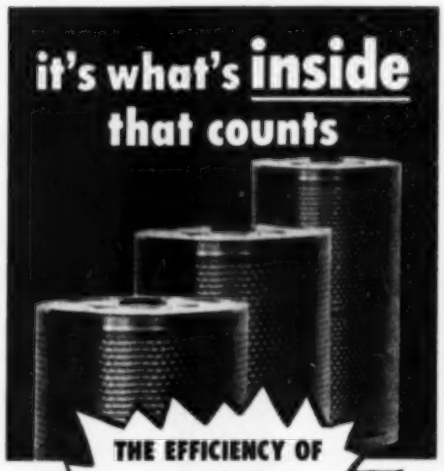
The new Quincy dual control permits selection of the most economical compressor operation for continuous or intermittent air requirements, according to the manufacturer, Quincy Compressor Co. of Quincy, Ill. When compressed air demand is high, the control is set for continuous compressor operation. The Quincy VD unloader unloads the compressor when maximum tank pressure is reached. The compressor then idles until additional air is needed. For reduced air requirements, the dual control can be set to operate the compressor intermittently. A pressure switch shuts off the compressor motor when the required tank pressure is reached and starts it when more air is required. The dual control can be added in the field to any Quincy unit equipped with loadless starting. Further information may be obtained by writing to the company.

McKay Forms Organization

Harlan C. McKay

Harlan C. McKay, former sales manager for Cummins Diesel Sales of Washington and previously Northwest regional manager for the Buda Co., recently established his own organization, the Harlan C. McKay Co., in Portland, Ore. He represents manufacturers in Oregon, Washington, Idaho, British Columbia and Alaska in calling on diesel engine dealers and distributors, manufacturers of heavy-duty logging and construction equipment and truck manufacturers. Mr. McKay reports that he will represent industrial equipment manufacturers such as Cotta Transmission Co., Torcon Corp., Young Radiator Co., Auto Engine Co., Inc., and Stratoflex, Inc. in the Northwest.

SALES MEETING—Representatives from six cities attended the recent sales meeting of C. Lee Cook Manufacturing Co. at its home office and plant in Louisville. The meeting included panel discussions and a tour of the factory. C. Lee Cook manufactures a high-grade line of industrial piston rings and rod packing rings. Among those attending the "refresher course" were *(front row, left to right):* Arthur Rumsey, Los Angeles; W. P. Mayo, Houston; Joseph C. Buerkle, New York City; President Fred D. Durham, Louisville; Foster Black, Amarillo; Chief Engineer C. J. Kramer, Jr., Louisville; M. A. Boulden, Philadelphia. *Middle row:* Earl Friedrich, R. J. Pohlmann, C. E. Hegewald, Ray Eyl, William Probst and Vice President P. W. Mettling, all of Louisville, and Joseph Lepic, Chicago. *Top row:* Phillip Kleinhenz, C. T. Duke, Charles Corcoran, Tom Furlong, Walter Rains, Assistant Sales Manager John E. Scoggan and B. G. Steitz, all of Louisville.



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√ Protects engine
The DIESELPAK is designed to remove not only ABRASIVES but also CONTAMINANTS such as moisture, carbon, acid, etc., from oil, and is engineered to keep the **filtering media** and the **removed contaminants** from migrating back into engine.

√ Extends periods between drains
The DIESELPAK collects and holds even the most finely dispersed contaminants without affecting or removing compound additives from the oil. A glance at the dip stick will show that the oil is CLEANER—symbol of better lubrication and longer oil life enjoyed only by Luber-finer users.

√ Takes less oil
The DIESELPAK because of its engineered construction requires 2 to 4 quarts less oil than spongy substitute filter elements being offered for use in the Luber-finer housing. This is an additional saving enjoyed when using the DIESELPAK.

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1. REFINING PACK—Introduced to the public in 1935 for use with straight mineral oils, fuel oils, hydraulic oils, and inhibited industrial oils.

2. DIESELPAK—First made available in 1941, the DIESELPAK was primarily designed for use with H. D. detergent compounded oils and has also achieved outstanding results when used with fuel oils and straight mineral oils.

Write for complete information to Dept. 31

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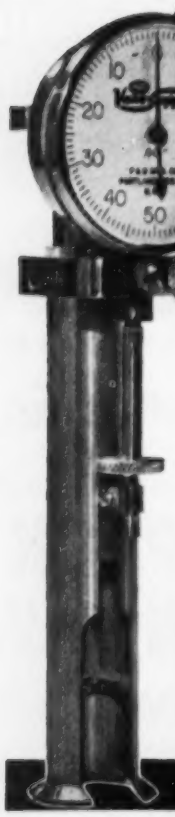
2514 S. Grand Ave., Los Angeles 7



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- Eliminates inaccuracies of individual "feel".
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- No departure from GM's recommended procedure, only method of indication differs.
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- Use on all passenger cars with valve-in-head engines.
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76 Pages—275 Illustrations
56 Engine Reference Tables
26 Parts Lists

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Water Separator & Fuel Filter

The new FRAM Water Separator & Fuel Filter is a *double-action* filter for complete injection system protection.

Here's what it does—

100% Water Removal—before injection . . . saves costly injectors from corrosion, rusting, pitting.

Traps Dirt and Dust—Micronic filtration traps and removes dangerous dirt before it reaches injectors . . . ends abrasive action!

Save down-time! Save cost of replacing expensive injectors. Write for information on a new FRAM Water Separator & Fuel Filter for your diesel today!

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OIL • AIR • FUEL • WATER
FILTERS

FRAM CORPORATION, Providence 16, R. I.

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Nordberg Dallas Appointments

R. C. Gamble

Marvin Wall

Appointment of Marvin Wall as district manager of the heavy machinery division and R. C. Gamble as sales engineer, Dallas territory, is announced by the Nordberg Manufacturing Co., Milwaukee. Mr. Wall succeeds C. B. Trimble, who retired recently, and will serve customers and prospective users in Oklahoma, New Mexico and north and central Texas. A native of Texas and a veteran of nearly 20 years in the diesel engine business, Mr. Wall began his career with Cooper-Bessemer Corp. in 1935. He joined Nordberg in 1949 to serve as sales engineer in the Dallas territory.

Mr. Gamble, a Milwaukeean, attended Marquette University and the University of Wisconsin. Following World War II service as a fighter pilot, he became associated with Cleaver-Brooks Co. and joined Nordberg in 1948 to work in the export sales department.

Distribution Director Named

William "Red" Pasma, former eastern regional manager of the Sealed Power replacement sales division, has been appointed director of distribution in the American Hammered automotive replacement division, according to an announcement by Rick E. Murbarger, general sales manager of the Sealed Power Corp., Muskegon, Mich. Mr. Pasma has an extensive background of distributor contact in the automotive replacement market.

At the same time, Mr. Murbarger announced that William B. Banta, who has been with the company since his graduation from Northwestern University in 1943, will assume the position of advertising manager for American Hammered in addition to his duties as sales promotion manager.

Dry-Type Micronic Air Filter

A new dry-type micronic air filter for both diesel and gasoline engines has been developed by Purolator Products, Inc., Rahway, N. J. The first major truck manufacturer to install the filter as optional equipment on its trucks is the Brockway Motor Co., Inc., Cortland, N. Y.

Similar in construction to the Purolator micronic automotive filter for lubricating systems, the new air filter has these advantages, listed by the manufacturer, over present standard type filters: a higher degree of filtration, thereby reducing the entrance of air-borne abrasives into an engine; a freer flow of air into the combustion chambers; and, because it is easier and cleaner to service, a reduced serviceability time.

Towboat Named After Veteran Riverman

A 70-ft. diesel towboat named in honor of a veteran Pittsburgh riverman was launched recently at the Dravo Corp. shipyard at Pittsburgh. The Ram-class vessel, named the *Cap'n Joe*, was built for Edward F. Smith, Inc., Pittsburgh towing firm. It was christened by the wife of the company's owner and named for Mr. Smith's father.

The *Cap'n Joe* is the second of five new towboats of the same type built by Dravo and designed to tow sand and gravel and coal barges and for marine construction work. The twin-screw craft is powered by two Atlas engines with total of 580 hp.

New York Manager Appointed

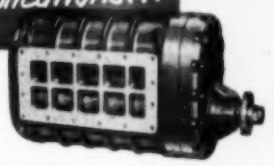
W. P. Streeter

William P. Streeter has been appointed manager of the New York City office of the engine division of National Supply Co., makers of Superior and Atlas diesel engines. Mr. Streeter, who began with the company as a salesman in 1944 and has served as sales engineer since 1950, succeeds Kjell Harry Nilsson, who has retired. Mr. Nilsson has been associated with the industry in the United States and Canada since 1922.

here's why MIEHLE-DEXTER SUPERCHARGERS put more horsepower in so many LEADING DIESEL ENGINES

Miehle-Dexter supercharged equipment bulldozes rock and overburden in an open-pit copper mine. Result: operators report more production, lower cost per cubic yard of material handled, reduced maintenance cost.

MIEHLE-DEXTER boosts horsepower up to 50% or more in engines used on all these applications...



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BUSES

CONSTRUCTION EQUIPMENT

TRUCKS

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MIEHLE-DEXTER SUPERCHARGERS
give you 4 big engineering advantages

Around ore fields and coal mines, on construction jobs and in quarries . . . wherever the going is rough and rugged . . . you'll find Miehle-Dexter supercharged equipment.

Here's why: (1) Internal construction uses patented rubber grid seals, vulcanized to metal end plates. This eliminates metal-to-metal contact, assures long service life and achieves fuel savings. (2) Lightweight aluminum parts boost power without adding weight. (3) Special wear strips permit practically zero clearance between rotor lobes and housing, eliminating metal-to-metal contact and assuring longer wear. (4) Standardized parts allow easy field service.

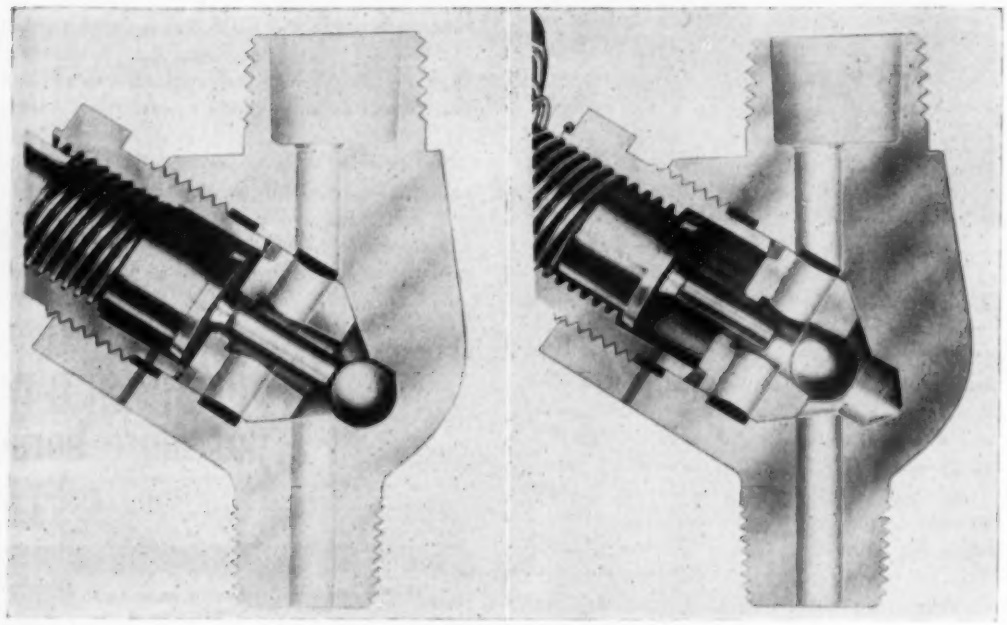
You, too, can register big gains in horsepower while reducing weight per horsepower. The investment is usually far less than required by other methods. Write now for technical bulletin.

MIEHLE-DEXTER SUPERCHARGER

INDICATOR VALVE FEATURES NEW DESIGN

Bacharach Industrial Instrument Co. has introduced an engine indicator valve, model YYL, of entirely new design. Instead of the conventional practice of using the tip of the valve spindle as the seating element, a free-floating nickel-alloy ball is used. The ball is forced into a conical seat by the engine pressure when the valve is closed. In this closed position the valve spindle is backed away from the ball and therefore shielded from the direct flame of combustion. This prevents galling of the threads and sticking of the spindle in the gland. The valve is opened by one turn of the handwheel which causes the spindle to move inward and force the ball off its seat.

This new design makes possible opening and closing the valve by hand pressure with assurance of positive, tight closure under all operating conditions. Such permanent pressure tightness is said to be of particular importance for application on gas engines and compressors where accidental opening of an indicator valve may result in hazardous conditions due to the escape of combustible gases into the engine room. Another practical advantage claimed for this valve is that it does not have to be removed from the engine for replacing any of its parts. Further information is available from Bacharach Industrial Instrument Co., 7301 Penn Ave., Pittsburgh 8, Pa.



Principle of operation of Bacharach's new model YYL indicator valve is shown in the cutaway views above. Picture at right shows valve in closed position. Engine pressure closes valve by forcing ball into the tapered hole of the valve seat. The valve spindle is backed away from the ball and shielded from direct flame of combustion to prevent galling of threads and sticking of spindle. In picture at left the valve is in open position. Spindle threads are left-handed; when spindle is turned to the left it moves inward, pushing the ball from its tapered seat and placing it in the cavity, entirely out of the pressure passageway. When valve spindle has reached fully opened position the beveled surface makes a pressure-tight connection with valve seat to close atmospheric vent hole and seal indicator.

IDEAL GENERATORS develop dependable power on U.S. Navy Floating Cranes

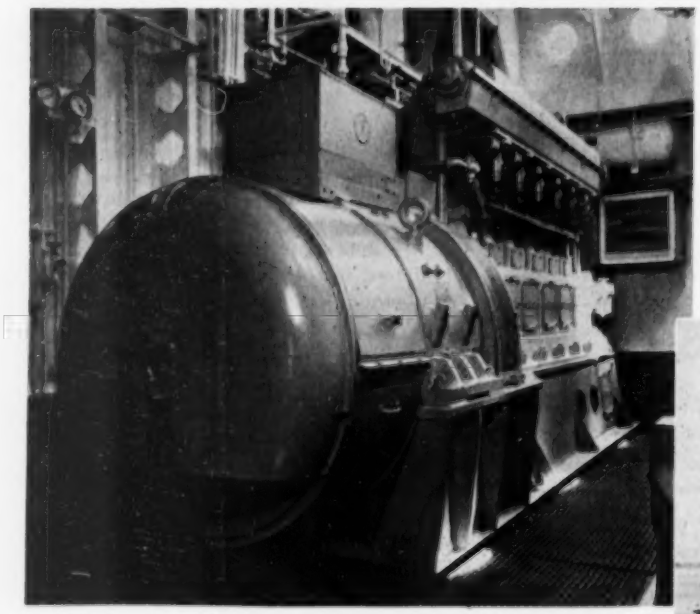
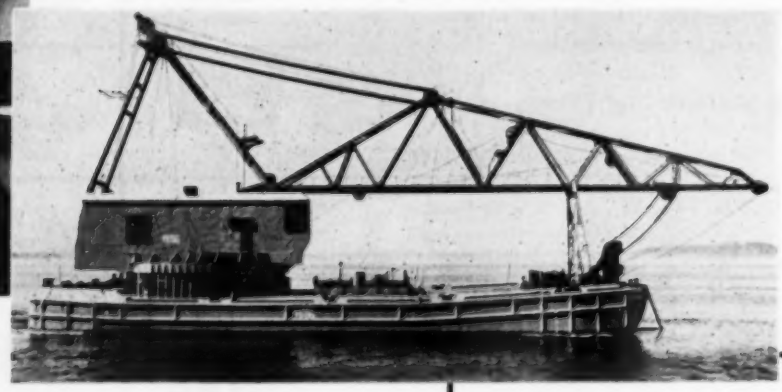


Photo above shows one of two 125 KW, 250 V, 600 R.P.M., compound wound, marine type, 40°C, continuous duty, drip-proof generators installed in each of two floating cranes built in Seattle for the U. S. Navy.

All-around dependable performance and rugged construction are "musts" in meeting the strict Navy requirements for power equipment. IDEAL GENERATORS have teamed up with diesel engines to meet the challenge—to provide power for operating the huge electric cranes.

The IDEAL characteristics that meet severe Navy requirements can be of benefit to you also. Let us figure on your needs.



These U. S. Navy cranes are powerful enough to pick up a sizable boat and place it on the front deck of the crane mounting for repair work if necessary. Also used for loading and unloading where dock facilities are inadequate.

The IDEAL ELECTRIC & Manufacturing Co., Mansfield, Ohio

Builders of DEPENDABLE POWER EQUIPMENT for over 50 years

Gulf Coast Diesel News

By Michael Pate

(Editor's Note: The first three items in this month's column are reproduced to correct inadvertent errors made in the August issue when the copy became scrambled during transmittal.)

CLEGG & HUNT, Houston, has purchased a model 24, 185 hp. Murphy diesel from the Houston Engine & Pump Co. which will become the third model 24 and the sixth Murphy diesel engine on the same drilling rig.

BANKS-MORELAND CO., Houston, has bought from Houston Engine & Pump Co. a Murphy diesel model 21 Weld Power 100 kw. generator set driven by a Murphy diesel model 21 rated at 150 hp.

CLEGG & HUNT, Houston, has purchased from the Houston Engine & Pump Co. two Murphy diesel model 12, 75 kw. generator sets for drilling rig power. These units are driven by Murphy diesel model 12 engine developing 110 continuous hp. at 1200 rpm.

GALE BUILDERS SUPPLY CO., Angleton, Texas, has purchased through American Bolinder-Munktell Co., Houston, two 3-cylinder Bolinder-Munktell diesels, rated at 45 hp. at 1500 rpm., which will be used to re-power two P & H ½-yd. draglines.

THE CITY OF BAIRD, Texas, has bought through the Odessa branch of Stewart & Stevenson Services, Inc., a General Motors model 16-567C diesel and dual-fuel engine which will normally be operated on 95% natural gas and 5% diesel pilot fuel. The diesel is connected to a 1000 kw. generating set, to be used for municipal power.

McCOLLUM EXPLORATION CO., Houston, has secured through Mustang Tractor & Equipment Co., Houston, a D311 Caterpillar diesel built into an externally regulated generator set which will deliver 440-volt, 3-phase, 60-cycle power for a well-logging system. The unit is designed for 20 kw. output at 1200 rpm.

KERRVILLE BUS CO., Kerrville, Texas, has bought through Cummins Sales & Service, Inc., Houston, one model BIS, 150-hp. Cummins diesel and one model NHB-600, 200-hp. diesel, both of which will be used to repower buses in the company's fleet.

W. M. WALLACE LUMBER CO., New Iberia, La., has secured through Waukesha Sales & Service, Houston, a model 135DKU Waukesha diesel developing 106 hp. at 1800 rpm. which will be used to repower woodworking machinery.

TOM HENDERSON, El Campo, Texas, has bought a Caterpillar diesel, model 13000, developing 190 hp. at 1200 rpm., which he will use to drive a deep-well pump for irrigation. The engine was from Mustang Tractor & Equipment Co., Houston.

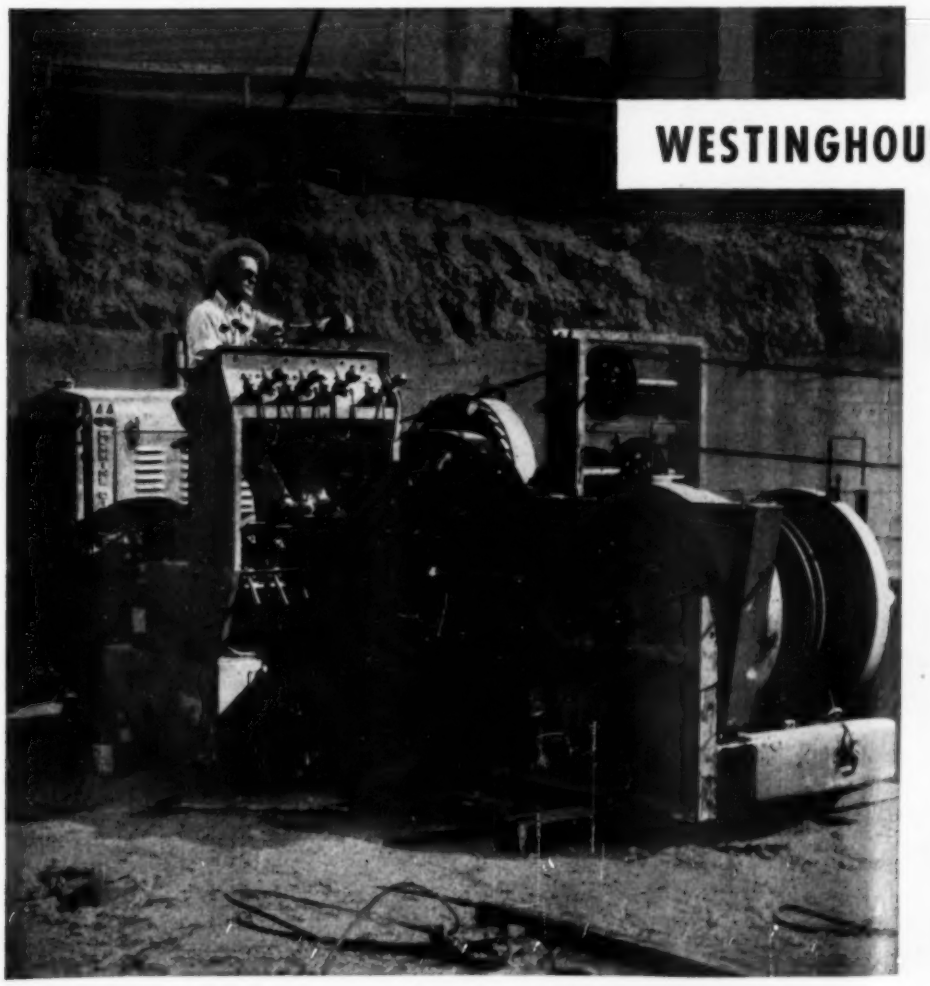
CONSOLIDATED SHIPYARD CO., Corpus Christi, Texas, has bought four General Motors series 110, model 62203, 200-hp. diesel marine propulsion units with hydraulic reduction and reversing gear to be used in powering two twin-screw crew boats the yard is building for Glasscock Drilling Co. Each boat will also have a Stewart & Stevenson model 2GD22 ac. generating set for lighting and auxiliary power. These units are driven by General Motors series 71, model 2061-A, 2-cylinder, 34-hp. diesels.

STONE OIL CO., Hobbs, N. M., has bought through Waukesha Sales & Service, Houston, a Waukesha diesel model 135DKB, developing 106 hp. at 1800 rpm. The diesel will be used to repower a truck.

BROWN & ROOT, INC., Houston, has bought through Big 3 Welding Equipment Co., Inc., Houston, ten 300-amp. dc. Lincoln welding generator units, each powered by a General Motors diesel. The units will be used in welded barge construction. Western Pipe Line Constructors, Inc., Austin, Texas, has bought eight similar units and R. H. Fulton Co., pipeline contractor of Lubbock, Texas, has added four more to its battery of such units.

STONE OIL CO., Hobbs, N.M., has bought from Waukesha Sales & Service, Houston, a model 135DKBS Waukesha diesel. The supercharged engine delivers 185 hp. at 2800 rpm.

ELLERBEE BROS., Port Arthur, Texas, steel tank constructing firm, has bought a Stewart & Stevenson model 110GD100 special 100-kw. ac. generating set to power multiple welding stands. Power is furnished by a GM series 110, model 62401 diesel.



WESTINGHOUSE PNEUMATIC CONTROL

reduces operator fatigue on diesel-powered hoist

• To meet the specific recommendations of iron workers who actually use this steel erection hoist, American Hoist & Derrick Co. controls the diesel engine throttle, clutches, and brakes with a pneumatic system supplied by Westinghouse Air Brake Co. Smooth acting pneumatic control gives fast, automatic operation, makes the machine *easy* to operate, and reduces the possibility of error or accident.

Westinghouse pneumatic controls are now giving the same benefits on cranes, oil drilling rigs, dredges, river boats and other diesel-powered equipment. Write for complete information.

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INDUSTRIAL PRODUCTS DIVISION WILMERDING, PENNA.

Manufacturers of air compressors, pneumatic cylinders, actuators, air control devices of all kinds, engineered pneumatic control systems and front end loaders.

Factory Branch: Emeryville, Calif. Distributors throughout the United States . . . See your Classified Directory. Distributed in Canada by: Canadian Westinghouse Co., Ltd., Hamilton, Ontario.

New Plant Pours First 'Heat'

The new Pacific Coast division of the Howard Foundry Co. in Los Angeles recently poured its first "heat" in the company's "lost wax" precision investment casting process. The new foundry division and the firm's electric alloy steel and sand casting division are located at 1860 E. Gage Ave.

Foundry Manager J. P. Kelly reports that his division is undertaking short pilot runs of experimental aircraft castings. He expects that about 100 workers will be employed when the plant reaches full pro- The "lost wax" investment casting process is not new to Howard Foundry Co., which has operated a plant in Milwaukee for several years.

1955 Diesel Convention

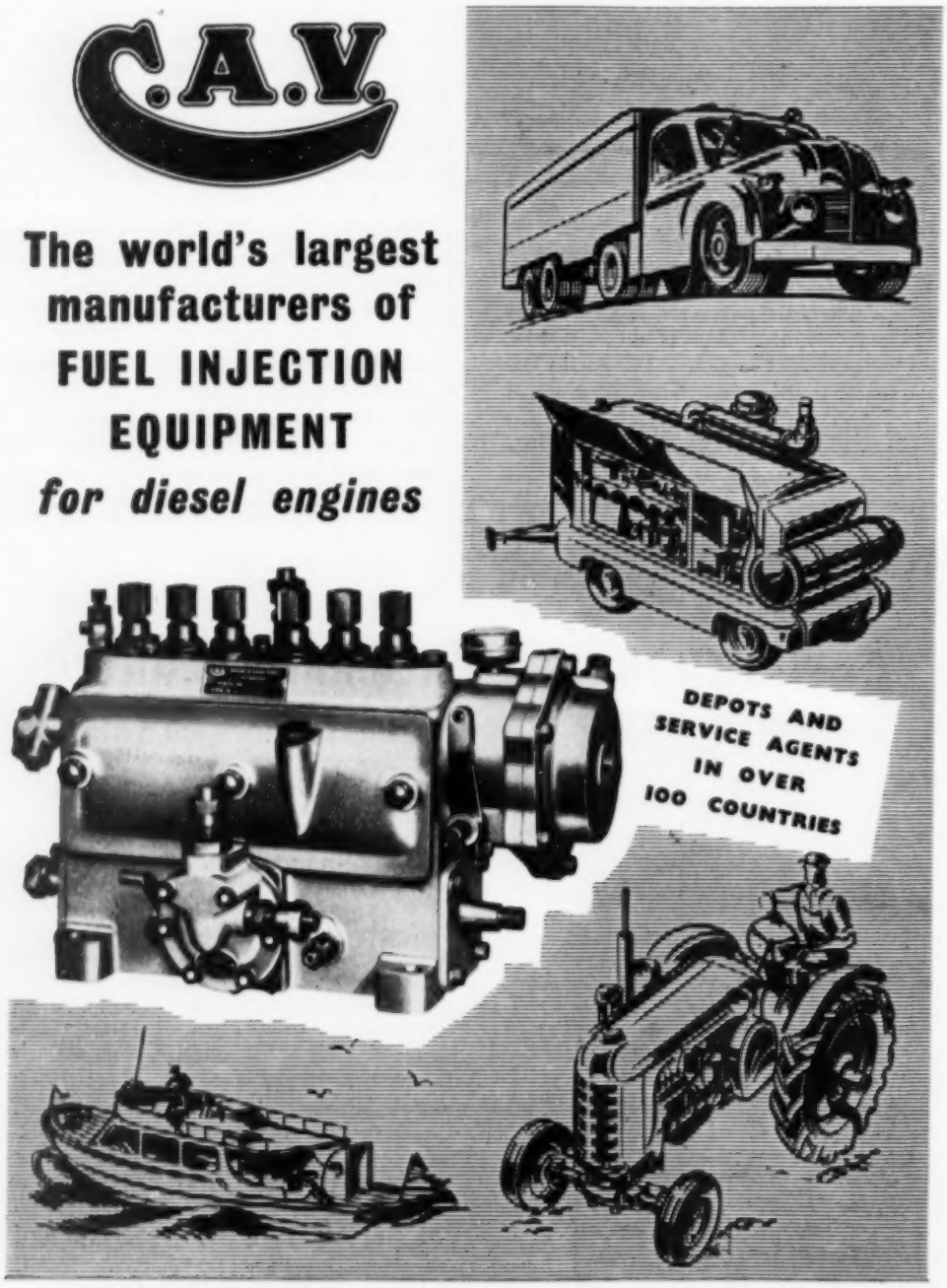
The 1955 national diesel convention will be held June 5-10 at the Statler Hotel, Washington, D. C. Accessory manufacturers who plan to exhibit at this annual conclave of the oil and gas division of A.S.M.E. should make arrangements with Chairman John A. Worthington, P. O. Box 626, Baltimore, Maryland.

Major Diesel Purchase Planned

In what will be its first major purchase of new equipment since 1948, the Philadelphia Transportation Co. is planning to purchase 300 diesel buses for its line at a cost of about $6,500,000.

C.A.V.

The world's largest manufacturers of FUEL INJECTION EQUIPMENT for diesel engines



C.A.V. DIVISION OF LUCAS ELECTRICAL SERVICES INC., 653, TENTH AVENUE, NEW YORK, 19, N.Y.
Sales Office: 14820 DETROIT AVENUE, CLEVELAND, 7, OHIO.

C.A.V. Fuel Injection and Electrical Equipment

West Coast Diesel News

By James Joseph

TO SOUTHERN PACIFIC CO., one Bucyrus-Erie shovel, model 38-B, with 6DA-779 Buda engine (powered through a Torcon converter) for use by its maintenance of way sections near Eugene, Ore. Sale by Portland's Hamilton Engine Sales, Inc.

RECENTLY INSTALLED in Star Kist Foods, Inc.'s *Robinhood*, a GM 2-51 diesel engine, through San Pedro's Crofton Diesel Engine Co., Inc.

ANDERSON-BEVIER CO., Inc., with branches in Los Angeles, Long Beach and Bakersfield, Calif., is a recently formed distributor of Buda engines and parts. The company also services Buda equipment. Owners-operators are A. Anderson and J. D. BeVier, both former Buda Engine and Equipment Co. employees. Anderson was west coast regional manager for Buda. BeVier, long associated with the LeRoi Co., Milwaukee, has more recently been Buda's assistant general manager of California branches. W. H. Benduhn will manage the Long Beach operation and D. L. Chumbley the Bakersfield branch of Anderson-BeVier.

A 100-TON floating crane, the *YD-195* has been delivered to the Naval Supply Center, Oakland, Calif., by its builders, Todd Shipyards of Seattle. The *YD-195* is powered by two model GA6 Union diesel generating sets. Each of the Union diesel engines is rated 150 kw. at 600 rpm.

HOST VESSEL at the recent fiesta of San Diego's Portuguese fishing colony was the tuna clipper *Constitution*, powered by Union diesels, with Capt. Manuel Neves as its sponsor. The *Constitution*, veteran of many a tuna cruise, is owned and managed by Joe S. Rogers.

REPOWERING the 50-ft. cruiser *Gypsy* with two 4-51 GM marine diesels driving through Walters 2:1 V-drives upped cruising speed one knot and replaced two 115-hp. gasoline engines. The *Gypsy* is owned by Jack Lillis, Seattle.

SEATTLE'S EVANS Engine & Equipment Co., Inc., recently repowered the halibut boat *Northern Light* with a 6-110 GM marine diesel. The 57-ft. trawler reports a good halibut season after replacement of its 100 hp. heavy-duty engine by dieselization. The old engine wasn't powerful enough for wintertime bottom trawling, report Owners Jonas and Hans Hoddevik, Seattle.

A NEW GM QUAD 24003, powering the new harbor tug *Titan*, has just finished first trials. The *Titan*, with a 77 by 56 propeller, is owned by Puget Sound Tug & Barge Co. Seattle's Evans Engine & Equipment Co.., Inc. made installation and sale.

IT TOOK JUST 10 DAYS to install a new 6-110 GM marine diesel with 4.5:1 reduction in Sverre Jangaard and Chris Furdal's *Souppin*, a halibut boat. The vessel was en route to halibut banks just prior to the season's opening when she broke a crankshaft in her 25-year-old heavy-duty engine. The vessel was towed to Seattle, a distance of 150 miles, and quick installation of the GM diesel got her back to sea in time for the run.

A CATERPILLAR diesel-driven Madsen asphalt mixing plant, model 481, 4000 lbs., is doing an outstanding job at Idaho Falls, according to Kiely Construction Co., Butte, Mont., its operator.

TO REPOWER a 700 series GMC truck, Portland's Hamilton Engine Sales, Inc. recently installed a Buda 6DAS-516 engine, 165 hp. at 2400 rpm., for Martin Brothers Logging Co., Winston, Ore.

LEONARD LUNDGREN Lumber Co., Bend, Ore., recently repowered a Crooks-Johnson portable sawmill with a Buda 6DAS-844 and a 6DT-468 for handling small stands of timber.

WORKING for the city of The Dalles, Ore., is a new Bucyrus-Erie model 15-B, powered by a Buda HP-326 engine.

MORRIS SUPPLY CO., of Tillamook, Ore., has repowered its operation with an HP-351 Buda gas engine.

INSTALLED in the fishing boat *New San Antonion*, owned by Isadore Califano, is a GM 6-110 diesel engine.

CROFTON DIESEL Engine Co., Inc., San Pedro, has powered the yacht *Constellation*, owned by Frank E. Hooykaas, with a GM 6-71. Two other recent deliveries to Star Kist Foods, Inc.: a GM 2-51 for its *Excellent* and a GM 3-71 for the *Virginia II*.

ANDERSON-O'BRIEN Co. delivered to Pacific Western Oil Corp., Los Angeles, two General Motors 60 kw. diesel-electric generator sets for petroleum service in the neutral zone of Saudi Arabia. These will be field serviced on the site by Yusuf Ahmed Alghenim, the General Motors distributor in nearby Kuwait.

DELIVERED TO GEORGE LIGHT, Portland, a model 6 DAMR Buda marine engine for powering his pleasure craft operating in the Portland area.

INITIAL SERVICE INSPECTION has been completed on four of the last six 6 DAS-844 diesels purchased by Oregon Lumber Co., Bates, through Buda Engine & Equipment Co., Inc., Portland.

L-M EQUIPMENT CO., Portland, has purchased a new series 2-51 GM diesel engine to power one of its model D-25 L-M pond and deck saws.

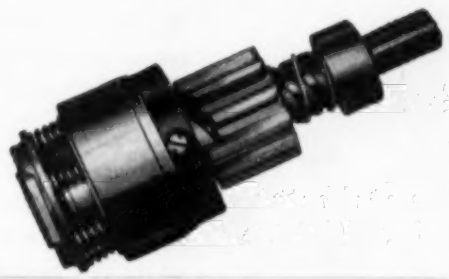
RECENTLY APPOINTED authorized Cummins dealer in San Diego, Calif., is E-W Equipment Co., 2286 Main St., owned and operated by Earl S. Winters. The company will continue to furnish Cummins service and replacements at the location previously occupied by F. R. Laux Diesel Service. The appointment was announced by Cummins Service and Sales, Los Angeles.

IT'S HERE! JUST OFF THE PRESS! Bigger, better, completely revised, rewritten and brought up to date. It's Volume 19 of DIESEL ENGINE CATALOG, now ready for mailing. Mail orders are now being filled for this giant reference book with its all-new, profusely illustrated sections. More than 400 pages. Orders are now being accepted for this limited edition, which costs $10 postpaid plus California sales tax, where applicable. Send checks or company form orders to DIESEL PROGRESS, Cole Station, Los Angeles 46, Calif.

CHECK and COMPARE
THESE FEATURES
• Starting motor can be mounted more easily and in more positions.
• Requires no actuating linkage—solenoid can be placed in any convenient position.
• Simple in design—has fewer parts—needs fewer adjustments.

Here's Why

PERFORMANCE IS BETTER WITH Bendix STARTER DRIVES



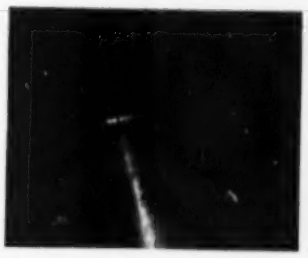
It takes a truly outstanding product to receive over 100,000,000 endorsements. Yet, that's the number of Bendix Drives that have been installed. No other starter drive approaches this record of outstanding performance. That is why, whatever your type of diesel or whatever its purpose, it will pay you to specify Bendix* Starter Drive for the most economical installation and dependable performance. *REG. U.S. PAT. OFF.

ECLIPSE MACHINE DIVISION of Bendix
ELMIRA, NEW YORK
Export Sales: Bendix International Division, 205 East 42nd St., New York 17, N. Y.

Diesel frame damaged by con rod failure completely restored.

Diesel heads restored same as new.

Diesel frame, City of Weatherford, Texas, in use ten years.



Crank shaft 50% break repaired in place. Restored to service for U.S. Government.

Write for bulletin describing our service.

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HOME OFFICE: 36-15 48th Avenue, Long Island City, N. Y.

Agencies in: Chicago, Tulsa, Houston, Philadelphia and other principal cities. Consult telephone directory.

METALOCK INTERNATIONAL ASSOCIATION, LTD.: Grand Buildings, Trafalgar Square, London, W. C. 2, and 35 other countries.

Packard Engineering Program

Packard Motor Car Co. has announced the establishment of a broad engineering project to develop new type, lightweight diesel engines widely adaptable to industrial and civilian uses. Discussions relating to power possibilities for trains of the future are being held with railroad officials on a strictly informal basis. Plans to expand diesel engine development work were cited as representing a major phase of the company's current and long-range diversification program. Packard has been producing marine diesel engines for the Navy since 1951.

Engineering officials said future development work will be guided by research which shows that lightweight diesel engines promise attractive operating advantages for industrial power applications, for large trucks and buses and for off-the-road vehicles, including trains.

Packard's diesel engine production facilities have been built up to a capacity considered adequate to handle current and anticipated Navy requirements. Manufacturing, machining and assembly operations are located at the company's Detroit plant in areas which formerly housed automotive operations. Other areas in the plant are expected to become available for expanded diesel engine programs later this year when the company completes plans for modernization and relocation of its automotive manufacturing facilities.

what does "CP" mean to you?

The letters "CP" are certain to become more important in your thoughts of filtration as times goes on. What do they mean to *you*?

You can give them many meanings. Consistent Performance. Constant Protection. Continuing Production. Calculated Profits. All of these are important to you. And all of them can be the result of the *real* meaning of "CP".

"CP" actually means Controlled Pressure . . . an exclusive, patented built-in system making it possible for hot or *cold* oil to pass through a *Winslow Element* instead of the by-pass under *contaminated* element conditions.

Here is full-flow filtration engineered to your needs. Demand *Winslow "CP" Elements.*

"CP" TRADE MARK

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A new and fully-illustrated brochure has just come off the press, giving a complete description of Winslow's exclusive "CP" Elements. There are no charges or obligations. All you need do is tell us where to send it.

WINSLOW FILTERS

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Three New Engineering Divisions

W. R. Crooks

D. L. Gallogly

T. O. Kuivinen

Formation of three primary engineering divisions at Cooper-Bessemer Corp., Mount Vernon, Ohio, has been announced by Ralph L. Boyer, vice president and chief engineer. Henceforth known as the Development Division, Technical Division and Product Division, the activities of each will be directed by its own chief engineer. Chief for the Development Division is W. R. Crooks, a graduate in mechanical engineering from the University of Missouri. He joined Fairbanks, Morse & Co. in 1923 and became associated with Cooper-Bessemer in 1936. Dennis L. Gallogly, new chief engineer of the Product Division, is a graduate in mechanical engineering from Ohio State University. He came to Cooper-Bessemer 25 years ago, was appointed supervisor of the Grove City (Pa.) test floor in 1934 and was made service manager for the company in 1940. Chief engineer of the Technical Division is T. O. Kuivinen, who holds two degrees in mechanical engineering from Ohio State University. He joined Cooper-Bessemer in 1929 and has held various engineering positions with the company during 25 years of continuous service.

The new Cooper-Bessemer engineering organization plan will be headed by Mr. Boyer and the program of the three divisions will be coordinated by E. Frederick, executive engineer.

Sales Engineer Named

M. A. Galvin

M. A. Galvin has been appointed sales engineer at the New York City office of the engine division of the National Supply Co., manufacturers of Superior and Atlas diesel engines. Mr. Galvin's background includes an association with an engine distributor in New York for a period of five years, and he previously served as a manufacturer's representative for a tractor company.

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Inland River Reports

By David I. Day

MISSOURI RIVER boating is at its highest peak in years. The National Molasses Co. terminal at Omaha is receiving bargeloads of molasses from the deep south regularly, the first shipments of this commodity to reach the big Nebraska port. Perhaps the most active boat in this trade is the *Twin Cities* of the B & M Towing Co., New Orleans. This boat came out new 14 years ago and has twin Fairbanks-Morse engines.

WITH MANY RAINS, the tributaries of the Missouri have been filling Big Muddy with floating trees and all sorts of debris. The new *Omaha* with G-M engines, on her first trip recently to her namesake city, had a rough time of it. Driftwood damage to the boat's propellers was considerable.

WE WERE PLEASED to see recently the *Chippewa* of the Genessee Transportation Co. fleet pushing Lake Tanker barges of gasoline. She was upbound and her General Motors engines, 1800 hp., were handling the assignment easily. She was about 100 miles above St. Louis and we understood she was in the Wood River-St. Paul trade.

ANOTHER BOAT pushing molasses up from deep Dixie is the *Harriet M*, another B & M Towing Co. boat, built by Nashville Bridge Co., using G-M twins, 1800 hp. Dale Temple, chief engineer, has a very efficient engine room and has every reason to be proud of the boat's performance.

FROM CARL A. GRISSOM, New Orleans, we had a fine July letter extolling the *Chas. W. Snider* of the Pure Oil fleet as "the best advertisement for Cooper-Bessemer diesel engines afloat on sweet water." Mr. Grissom and your correspondent saw this boat together at Evansville, Ind., about 12 years ago. We saw the boat not long ago at Greenville, Miss., still a neat-looking craft. Louis Picoa is chief engineer with James Metzel as his assistant.

WILL CUMMINS is chief engineer of the fleet and very popular *Harry Truman*, greatest of the FBL boats. She was built at Avondale Yards, New Orleans, in 1948 and has broken record after record. She uses General Motors twins, about 3200 hp. Recently she was upbound near Memphis.

MANY RIVERMEN around Greenville and Vicksburg, Miss., feel the *Carl D* of the Vest Towing Co., Greenville, deserves more publicity. She has a G-M diesel engine rated at around 900 hp. and is truly a smooth worker. R. L. Christian is chief engineer with W. H. Reed as assistant.

OUR COMPLIMENTS to the crew of the diesel tug *Capt. Talfor*, Caterpillar-powered, 400 hp., noted in the oil trade below Vicksburg. She is one of the Houston Barge Line tugs. We don't recall having seen her before, but she is very nice.

THE NEW *Sullivan* of the U. S. Engineers at Memphis, Tenn., is at work sounding river depths and making navigataion channels on the Mississippi. She is a nice appearing boat propelled by twin Superiors, about 600 hp. P. M. Nevens is chief engineer with D. C. Hudson as assistant.

ONE OF THE MOST active boats on the upper Ohio recently is the *Neville* of the Union Barge Line. She came out new from Dravo yards back in 1935. However, her present General Motors engines were installed only about six years ago. Mrs. C. K. Brandon mailed us a snapshot of the boat in July showing her pushing 14 barges of steel.

MANY TOURISTS prefer to photograph the diesel sternwheelers. Joe Hatfield, Boston Mass., recently had quite a collection taken along the Ohio. The finest of these pictures technically was a black-and-white of the *Helen Z* of the General Barge Line with Fairbanks-Morse engine of about 500 hp.

JOHN A. BRAKE, chief engineer, and James Braddock, assistant, had the M/V *Reliance* tuned up just right as she pushed a nice tow downstream on a late July day. Aboard, we understood, was a well-known motion picture cameraman, G. S. Strickling of Cleveland Heights, Ohio. This fine tow has twin Superiors of about 2800 hp.

IT WAS A PLEASURE to see again the old *Paul Blazer*, once featured in DIESEL PROGRESS. This Ashland Oil favorite is a lucky 13 years old. She uses twin Superiors, 2000 hp. When seen she was headed up the Ohio with seven barges of oil, two of asphalt and a number of empties.

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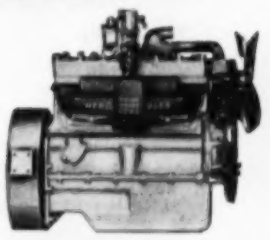

The increased demand for Hercules Engines and Power Units has resulted in a nationwide expansion of Hercules sales and service facilities. The above photograph is of the new Los Angeles branch which is the latest addition to the Hercules sales and service stores.

Facilities of this and other factory branches include: a salesroom, complete parts department, offices and a fully equipped machine shop for engine repair and rebuilding. In addition to the branches in the west and southwest, Hercules distributors throughout the country stand ready to provide immediate service in the following fields; automotive, agriculture, construction, industrial, marine and petroleum.

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DATA SHEET NOW

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DEPT. 34, RIVER ROAD

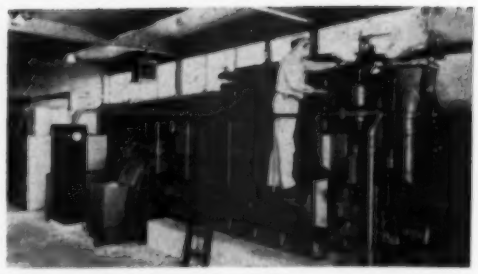
WASHINGTON 16, D. C.

New Drott '4-in-1' Attachment

An end to the search by smaller communities and contractors for a single piece of machinery capable of handling a multiplicity of earth-moving jobs is promised by the new Drott "4-in-1" hydraulic controlled attachment for International TD-6 crawler tractors. The "4-in-1" was first revealed at the recent International Harvester Industrial Power Roundup in Phoenix, Ariz. It can be converted into a bullclam shovel, a bulldozer, a front-end loader or a clamshell by placing the "shovel-selector" lever in the desired position, whether the tractor is in motion or standing still. In addition to the shovel features, it may be used as a backhoe. Over-all width of the unit is 68 in. Height is 40 in. Its shovel capacity is ⅞ of a yard with lifting capacity of 3000 lbs. Break-out force is in excess of 8500 lbs. The total weight of the "4-in-1" and the TD-6 crawler tractor is less than 9000-lbs.

New Drott "4-in-1" attachment, mounted on an International TD-6 crawler tractor, in operation as a bottom dumping clamshell shovel.

IT'S HERE! JUST OFF THE PRESS! Bigger, better, completely revised, rewritten and brought up to date. It's Volume 19 of DIESEL ENGINE CATALOG, now ready for mailing. Mail orders are now being filled for this giant reference book with its all-new, profusely illustrated sections. More than 400 pages. Orders are now being accepted for this limited edition, which costs $10 postpaid plus California sales tax where applicable. Send checks or company form orders to DIESEL PROGRESS, Cole Station, Los Angeles 46, Calif.



BOOSTS WATER SUPPLY—The Houston (Tex.) Water Works has placed its latest supercharged spark ignition gas engine in operation. The new engine, built by Worthington Corp.'s Buffalo works, is rated at 980 hp. at 600 rpm. It drives a 700 kw. Electric Machinery generator supplying power to pumps augmenting the water supply to Houston's industrial area. The project, known as the San Jacinto River Project, is part of the city's plan for shifting from diminishing well supplies to surface water from the river. There are at present four recently installed Worthington centrifugal water works pumps with a capacity of more than 80 million gallons a day in the water distribution system.

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DALLAS, TEXAS

The "Goodwill"—No. 500

By Ed Dennis

L. C. RINGHAVER did it again! One hundred vessels in less than 10 months, and the Florida fishing industry was proud as the 500th trawler was launched recently by Diesel Engine Sales, Inc. of St. Augustine. When the trawler *Goodwill* slid down the ways on the San Sebastian river it meant that the Florida firm had achieved an enviable record in the annals of American shipbuilding: 100 vessels in less than 10 months and 500 in less than 11 years.

The *Goodwill* was christened by Mrs. Le Roy Collins, wife of Florida's next governor. Many dignitaries and distinguished guests from throughout the nation applauded as the vessel slipped onto the river to await a useful life as it was placed at the disposal of the Tampa Shrimp Producers Assn. for research and development of new shrimp grounds.

Powered with a D13000 Caterpillar diesel engine supplied by the Gibbs Corp. of Jacksonville and driving a 48 by 44 5-blade Columbian propeller through Goodrich cutless bearings, its speed on the trial runs was better than 11 knots. Some of the other engineroom features are: keel cooling, Snow Nabstedt 3:1 reduction gears and a Twin Disc power take-off. The accessories include a 1500-watt Delco Remy generator, Goulds pumps and a Desco silencer.

E. L. "Bluff" Petersen, who was the discoverer of the "golden" shrimp beds off Key West, will serve as captain in the search for new shrimp beds. This vessel is the first shrimper to be equipped with a "fischlupe," an electronic fish finder.

Mr. Ringhaver explains the working of a Florida type dieselized shrimp trawler to Governor-elect Collins *(left)* and Senator Pope *(right)*.

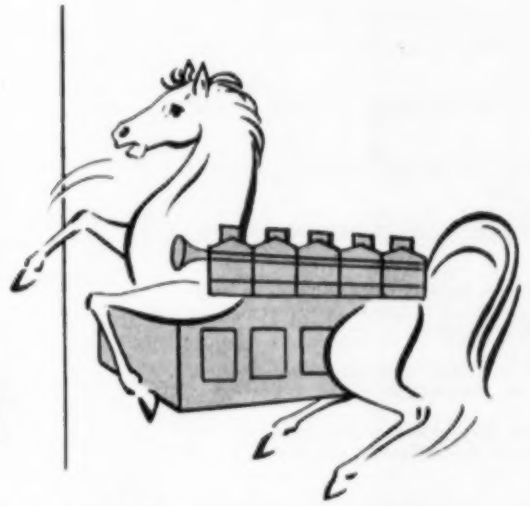
1-Man Engine Work Stand

An engine work stand combining the advantages of end roll-over operation and bench-level working height has been introduced by Bacharach Industrial Instrument Co., Pittsburgh. With it, a mechanic can raise or lower an engine weighing up to 5000 lbs. in one simple operation without help or use of auxiliary equipment, Bacharach reports.

Designed for side mounting of an engine, the stand permits rotating the engine 360° in a vertical plane by hand operation of a crank which operates a 60:1 ratio worm and drive gear that revolves a heavy-duty spindle. The spindle is hinged and can be tilted with the stand's hydraulic jack to provide the required swing radius which at maximum spindle tilt is 34 in. The stand is supplied as a mobile unit or as a stationary model for bolting to the floor.

The stand is readily adaptable for holding all well-known engine models as well as transmissions, axles, differentials and other automotive components. Over-all dimensions of the mobile stand are: height, 35 in.; width, 42 in.; front-to-back, 43 in.

Details about the stand are given in Leaflet 683, available by writing the Bacharach Company at 7301 Penn Avenue, Pittsburgh 8, Pa.



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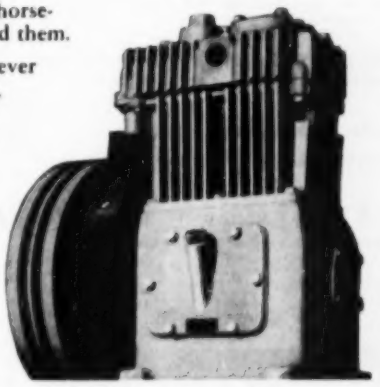
Select a Quincy Compressor whenever you want a *dependable* air supply. The compact and rugged Quincy design will withstand rough use and give you maximum performance with minimum service.

There's a Quincy Compressor for every diesel starting job. Let us help you select the right model from a variety of mountings and sizes from 1 to 90 CFM.

Write Dept. K-39 for a catalog on the complete line for diesel service.



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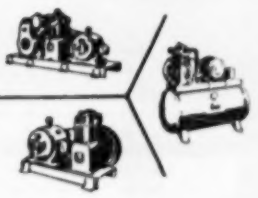

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AMOT Thermostats Offer the Following Advantages:

1. **Large capacity combined with light weight.**
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4. **Temperature is fixed and cannot be tampered with by operator.**
5. **Holds close regulation and is not sensitive to pressure.**
6. **Operating forces are very large and with no packing glands there is no chance of valve ever sticking or becoming inoperative.**
7. **Because of its simple and rugged construction, practically no maintenance is ever required.**
8. **Has positive 3-way valve action in which full pump capacity flows through the engine at all times.**
9. **Compact in size and will operate in any position, which facilitates piping.**
10. **Available in pipe sizes up to 6" for all types of gas engines, diesel engines, and compressors.**

Write for Catalog and name of your nearest AMOT Representative

AMOT CONTROLS CORP.
(Formerly American Motors Company)
RICHMOND, CALIFORNIA

Mid-Continent Diesel News

By **Jack F. Cozier**

THE KERR - McGEE uranium plant in New Mexico is having installed two of the newest designed LeRoi natural gas generating sets. Carson Machine & Supply Co., Oklahoma City, is making the installation of these L-4000 series LeRoi units.

DIXIE MATERIALS CO., Ingleton, Texas, is repowering a P & H ½-yard drag line with a Bolinder-Munktell diesel engine. The 45-hp. unit uses a Fram filter with a Swedish Bosch injector.

STEBBINS Construction Co., Tulsa, has just purchased an IH 2T55 rubber tired hauling unit equipped with a Cummins HRB-600 diesel engine. The hauling unit will be used for industrial development around Tulsa.

EAST TEXAS water flood projects will be making use of two 8M0-1290 Buda natural gas engines which were shipped from Tulsa by the Buda Engine and Equipment Co.

BUB JAMISON, Ingleton, Texas, has purchased a 3-cylinder Bolinder-Munktell diesel engine. The 1053 series unit will use a Luber-finer filter.

HAINES DRILLING CO., Preston, Okla., has purchased an Oliver DDH tractor powered with a 60-hp. Hercules diesel engine. The tractor was sold by Midwestern Engine and Equipment Co., Tulsa, to be used for clearing land and making mud pits.

BIG THREE Welding Machine Co. is having a prototype Bolinder-Munktell test unit flown in from Sweden to be used to power a 200-amp. welding machine. The 1-cyl. model develops 14½ hp.

DOTSON CONSTRUCTION CO., Tulsa, has just bought an IH T-18 tractor powered with IH DT-18 diesel engine to be used in a housing development project and in sewer construction at Broken Arrow.

BUDA ENGINE and Equipment Co., Tulsa, has just shipped six BD-230 Buda diesel engines for mobile well-servicing in Oklahoma and Kansas.

HANES CONSTRUCTION CO., Garnett, Kan., has purchased a Unit 614 back hoe from Midwestern Engine and Equipment Co., Tulsa. The unit is powered by a 2-cylinder GM diesel engine and will be used on pipeline projects.

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TORQUE WRENCHES
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in inch grams...inch ounces...inch pounds ...foot pounds
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Fairbanks-Morse 1136 KW. on our test stand.

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Hard Chrome deposited on crankshafts by "Rotary Process" adds new shaft life. Shafts electro heat treated 3 times.

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All parts carefully magnafluxed to detect hidden defects.

Experienced Workmen — Specially Designed Machinery—Careful Inspection, guarantee each job.

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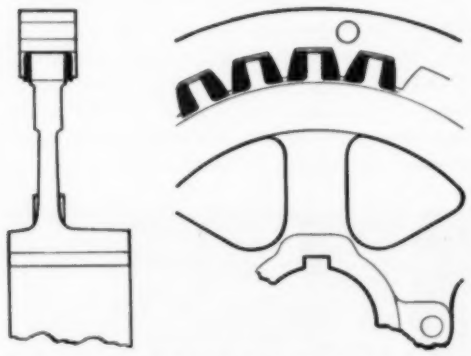
Diesel Distributor Appointed

S. F. Pecaut

The Pecaut Equipment Co. of Sioux Falls has been appointed distributor for the sale and servicing of General Motors Detroit Diesel engines for the state of South Dakota. Headed by S. F. Pecaut, the company has operated in South Dakota since 1936 and presently represents the Euclid Road Machinery Co., Northwest, Ingersoll-Rand, Gorman-Rupp, Construction Machinery and other construction equipment manufacturers. Mr. Pecaut reports that the Detroit Diesel engine service section in the company's establishment at 900 E. Eighth St. is to be entirely separate from other servicing facilities now maintained and that the latest factory-approved tools and servicing equipment are being installed. Darrel Pecaut will head the diesel activity as sales manager with William Taylor as service manager and Robert Schuknecht as parts manager.

Rubber Block Drive Available



Edge view *(left)* and cross view of Twin Disc rubber drive, which bolts directly to the flywheel, show how the drive is designed to provide plenty of rubber working out at good diameter for long, trouble-free life.

Availability of rubber block drive for general use on powered industrial equipment is announced by Twin Disc Clutch Co. of Racine, Wis., and Rockford, Ill. This special drive was developed primarily for use on Twin Disc torque converters and disconnecting fluid power take-offs. It is now standard on these products as well as on some models of Twin Disc marine reverse and reduction gears.

Among advantages cited by Twin Disc from the use of rubber block drive is absorption of both angular and parallel misalignment. In appearance, the drive resembles half of a gear-tooth type flexible coupling, with the exception that the gear teeth are large rubber blocks molded from one of the new synthetic rubber compounds. The mating driving ring, precision shaped, bolts directly to the flywheel. Although it is generally mounted to absorb angular and parallel misalignment, the drive can be adapted to form a piloting type coupling to handle only angular misalignment.

Rubber block drive is now offered in four sizes. Any engine using a 14, 18, 21 or 24-in. Twin Disc friction power take-off can be fitted with the drive as an interchangeable feature with no modification required at the flywheel. For installations requiring a clutch in the input drive, rubber block drive is also available in Twin Disc Model E and EH heavy-duty friction clutches in 14, 18, 21 and 24-in. sizes. For complete information on this special drive, inquiries should be sent to E. B. Falk, General Sales, Twin Disc Clutch Co., Racine, Wis.

Sales Manager Appointed

Appointment of Charles H. LeFevre as sales manager of the replacement sales division has been announced by Rick E. Murbarger, vice president in charge of sales of the Sealed Power Corp., Muskegon, Mich. He succeeds John E. Norwood.

Mr. LeFevre joined the sales and advertising department of the corporation in 1935. He was named assistant advertising manager in 1943 and became advertising and sales promotion manager in 1945. He is president of the Automotive Advertisers Council. Mr. Norwood, who had served as sales manager since 1943, requested to be relieved of his responsibilities in this position. A veteran executive in the automotive replacement industry, Mr. Norwood has been associated with Sealed Power for more than 35 years. He has taken over as manager of advertising and sales promotion.

Ed Gray, former southern regional manager, has been appointed an assistant sales manager, as has Edward S. Schulze, former central regional manager. Both became regional managers in 1952.

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Outboard Propulsion and Steering Units

your complete marine power package

Easily installed for immediate use. Mount with four hold-down bolts . . . and you're ready to operate.

Harbormaster Outboard Propulsion and Steering Units are complete marine power packages, *ready for immediate use. Everything is included* . . . fuel tank, battery, steering mechanism, even the hold-down bolts. Mount; put in fuel; start; and you're off with exceptional power and maneuverability. Harbormasters give you special features not found with ordinary marine power. They are the outstanding and practical choice for jobs where you want an easily installed marine power unit you can depend on.

- **Steers instantly in any direction with full power**
  Exclusive patented M&T 360° Propeller Thrust Steering Control gives you the ultimate in maneuverability.
- **Underwater parts easily accessible for maintenance or repair**
  Special 180° elevating mechanism allows one-man operator to raise entire submerged assembly to any degree he desires. No dry docking or diving for repairs necessary.
- **Provides protection in shallow water**
  Patented shear pin automatically shears off should underwater assembly strike a submerged obstacle. Assembly rides over obstacle, *free from damage*, without loss of forward motion or operating power. Pin easily replaced while under way.
- **Economical to operate and maintain**
  You realize savings in fuel expense because you get *more thrust per horsepower* with outboard propulsion. Harbormasters give you rugged, dependable operation with a practical minimum of maintenance and service.

Specifications:
Sizes available from 20 to 300 h.p., gas or diesel power. Model 0-41H (illustrated).

Engine H.P.	50
Engine R.P.M.	2300
Propeller diameter	30"
Propeller pitch	15"
Propeller R.P.M.	608
Fuel tank	16 gallons
Cooling	radiator
Height above deck	48⅜"
Width	36½"
Weight (dry)	2780 lbs.

Hundreds of Harbormasters are in continuous marine use in many applications. Send today for Harbormaster Catalog containing specifications and over 70 photos and diagrams.

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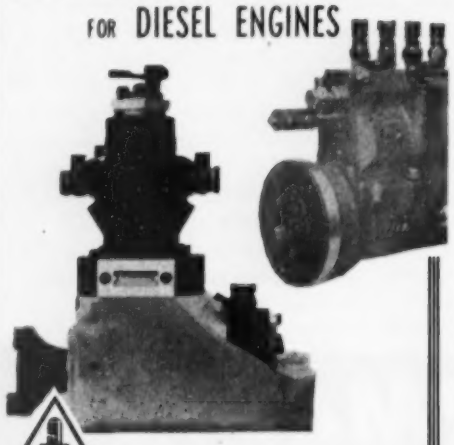
FOR DIESEL ENGINES



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ACCESSORIES AND SPARE PARTS
FOR ANY TYPE
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Unit Capacities
10 to 1875 Kva
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Write or wire today for bulletins and complete information regarding these fine fully guaranteed, low cost DIESEL ENGINE GENERATING UNITS. Visit our plants at Sausalito (S.F.), California, and Eddystone, Pa., and see units in operation on our test stand.

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Like money in the bank!

A casting is almost never broken beyond repair. It does not always have to be replaced. Repairs can be inexpensive . . . and the repaired unit will deliver "as new" performance.

DO NOT DISCARD IT

For only a fraction of its replacement cost, Southern Welding and Engineering Company experts can rebuild that shattered casting. Like hundreds of satisfied customers, you too will be amazed at the "impossible" repairs they achieve.

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ENGINEERING CO.

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Please address all inquiries to our Wichita Falls plant.

District Managers Appointed

E. L. Farrell

W. C. Young

Appointment of E. L. Farrell as district manager for the Milwaukee territory and William C. Young as district manager of the Great Lakes territory is announced by R. W. Bayerlein, vice president of the heavy machinery division of Nordberg Manufacturing Co., Milwaukee. Both districts will have headquarters at Nordberg's main office and plant. Mr. Farrell's territory includes Wisconsin, Minnesota, Iowa and northern Illinois and Mr. Young's assignment will be to serve customers in Michigan, Indiana, Ohio, Pennsylvania and Kentucky.

The educational and professional backgrounds of the two managers are almost identical. Both are natives of Wisconsin who entered Marquette University's engineering school in 1937. During their last three years at the university they served Nordberg as co-op students spending half time at school and half time working in the diesel engine erection and test department. Following World War II, both were appointed sales engineers handling special assignments out of the Milwaukee office. The change in territorial responsibilities came with the promotion of H. W. Dow to chief sales technician and Nordberg's expansion program.

Sales Manager Named

C. L. Thompson, formerly general manager of the Oregon branch of the Buda Company, has been appointed sales manager of the firm's material handling division. His appointment was announced by L. C. Daniels, vice president of the division. Mr. Thompson joined Buda, a division of Allis-Chalmers Manufacturing Co., in 1952 and was assistant general manager of the company's California branch prior to heading the Oregon branch.

U. S. Shipbuilder Featured at Italian Exhibit

The joint exhibit of the Korody Marine Corporation, Hawthorne, California, shipbuilder and marine designer, and Navaltecnica Internazionale, Rome, its Italian associate, has proved to be one of the outstanding features of the first International Maritime Marine Exhibition, which opened in Naples, Italy, recently. The Exhibition, which is dedicated to the progress of shipbuilding and allied industries, and which will continue for four months, is being participated in by three American companies of which Korody is the only West Coast representative.

The Korody Marine Corporation exhibit centers around a model of the U.S.S. *Nautilus*, the world's first atomic submarine, the very latest accomplishment of naval architecture. The cutaway section of this model shows in an illuminated form, the workings of the atomic reactor plant. The second principal item is a cutaway demonstration model of a 300 hp. diesel engine, manufactured by a Korody subsidiary, the Venn-Severin Engine Works, Inc., a firm now entering its fiftieth year of existence. The exhibit's third item, which drew the largest crowds at the opening, is an animated illustration of a 95-ft. Coast Guard vessel. The Korody Marine Corporation has been active for many years in the design and construction of vessels, and is well-known for its work in providing naval craft and maintenance to naval forces throughout the free world. At present, four vessels are under construction, two of which are nearing completion.

Paul Korody (center) makes a last minute check of the Korody Marine Corporation's exhibit at the International Maritime Exhibition in Naples, Italy before the opening. Visible in the right foreground is a marine diesel engine manufactured by a subsidiary of the Korody Marine Corporation.

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LARGEST CRANKSHAFT GRINDER IN A JOBBING SHOP

Florida Diesel News

By **Ed Dennis**

FOUR MILLION DOLLARS will be the cost of the 200 new GMC buses for the Miami Transit and Miami Beach Railway Co. These new luxury vehicles will be powered with General Motors diesel engines of the 71 series.

ELLIS DIESEL Sales & Service has been appointed authorized dealer for the Detroit Diesel Engine Division of GM for Broward County. Harold Ellis, president, was formerly service manager at the Miami branch and has a background of over 20 years in the diesel engine industry. They are located at Lauderdale Marina, Fort Lauderdale.

AT HOOKERS POINT, the Skipper Shipbuilding Co. included two 5 kw. Kohler diesel generating sets on the shrimp freezer vessel *Peggy C.* Main engine is a 210-hp. Murphy with Twin Disc pto.

FROM CUMMINS Diesel Engines of Florida, for installation in two model 1201 Lima draglines, two model NVH 1200 Cummins diesels, 400 hp. each, with Torcon torque converters for the Ideal Crushstone Co.

AT JACKSONVILLE, a Hercules model DH 200 from Marine Motors Sales Corp. for the *Nazare II* with Capitol 3.88:1 reduction gears. The power take-off is Twin Disc.

AT MOORE HAVEN the latest addition to the power plant is a model D. S. Q. 36 Enterprise diesel engine rated at 1200 hp. with an 840 kw. Elliott generator. A Woodward governor is also included.

FLORIDA-GEORGIA Tractor Co., Miami, delivered to the De Fonce Construction Co. a Drott skid shovel with a TD 9 International diesel.

BROOKS PAVING CO. purchased from Cummins Diesel Engines of Florida a model NHRS Cummins diesel rated at 300 hp. to power a Koehring crane. Also included was an Allison Torqmatic converter.

"JEAN LA FITTE" roams the Gulf of Mexico again. Named after the colorful buccaneer, this husky 73-ft. vessel built by the West Coast Shipbuilding Co. of Tampa is powered with a 210-hp. Murphy diesel. Also included were a 3 kw. Onan diesel electric set, Westinghouse compressor.

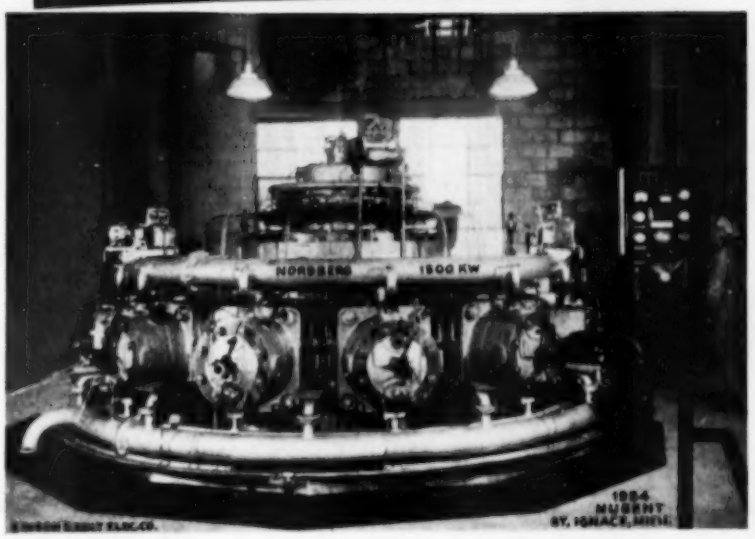
SIX FAIRBANKS-MORSE opposed-piston type diesels model 38-F-5¼ rated at 450 hp. each at 1200 rpm. for installation in the two interceptor stations of the new Miami sewer project.

IN TAMPA AND MIAMI the Allison Torqmatic Converter Service School, under the direction of Bob Burks, was having a large attendance of both service men and manufacturers' representatives.

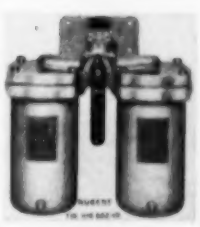
CONSOLIDATED Railroads of Cuba has ordered 51 diesel electric locomotives from General Motors Corp. The new diesel locomotives will replace 137 steam locomotives and will complete dieselization of this Cuban railroad.

AT TARPON SPRINGS the Sarris Boatbuilding Co. is building two 60-ft. vessels which will be powered by D 13000 Caterpillar diesels with Snow Nabstedt 3:1 reduction gears. Both will have Naples as their home port.

Nugent filters selected as original equipment at St. Ignace power plant



Shown in the view above is a 1500 kw Nordberg Radial Diesel installed by the Edison-Sault Electric Co. for municipal power service at St. Ignace, Michigan. Included as original equipment on this diesel was a Nugent Duplex Fuel Oil Filter of the type that removes 99.8% of all foreign solids from the fuel supply. The St. Ignace installation is still another example of Nugent filters being selected as original equipment by a leading diesel manufacturer.



Nugent duplex fuel oil filter of the type used on the new diesel at St. Ignace. Bag type recharges are inexpensive and simple to replace.

Nugent filters are available in a wide range of sizes and types to meet every need. Size for size they provide 20 times more filtering area than any other filter. Full or by-pass filtering is possible with the same unit and simple piping makes installation easy. These are some of the reasons why leading diesel manufacturers specify Nugent filters as original equipment.

To assure longer life and better service from your own diesel, investigate the possibilities of Nugent filtering. Write today for complete information.

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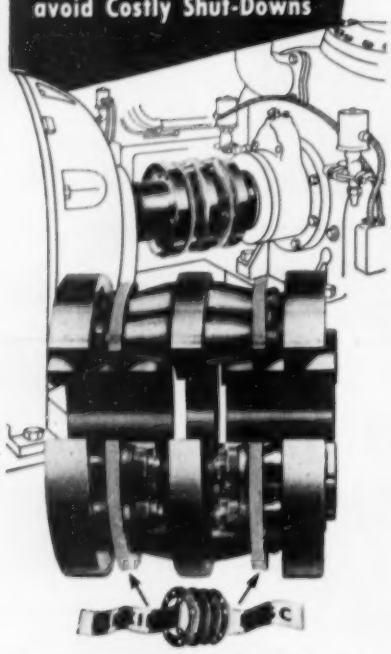

Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

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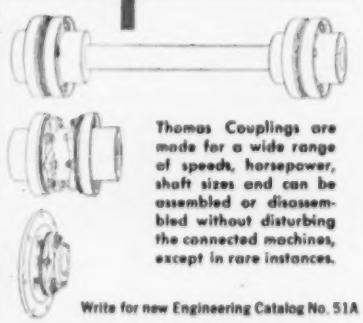
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



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THOMAS FLEXIBLE COUPLING CO.
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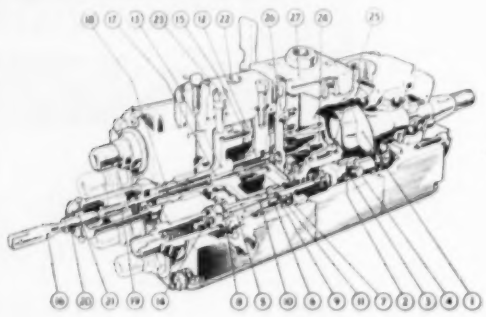
European Diesel News

By Hamish Ferguson

MONO-CAM LTD., Central Avenue, West Molesey, Surrey, has introduced a fuel injection pump which is a complete departure from conventional practice. Instead of a long multi-throw camshaft, a single lobe face cam operates the elements in rotation through the medium of rollers. The drive from the engine is transmitted through an adjustable coupling to the face cam (1) which is supported in ball bearings. The cam rollers (2) are mounted on needle roller bearings (3) and side thrust is taken by special thrust washers (4). The elements consist of three parts: barrel (5), plunger (6) and control sleeve (7). Injection begins when the plunger covers the port holes (8) in the barrel and ends when the upward motion of the plunger causes the groove (9) to leave the control sleeve allowing the fuel oil to escape through the center hole (10) and the cross holes (11). All the control sleeves are housed in a circular plate assembled as one member (12) mounted on a control shaft (13) to which an axial motion is imparted by governing devices as and when variation of delivery is required. The delivery valves (14) are of the pressure relief type with flat seatings.



The pressure created by the "spill" of the pumping elements is utilized for governing over the whole speed range. This is achieved by restricting the return of this "spill" to the feed side of the pump. The pressure thus created is acting on the enlarged stem (15) of the control shaft (13). The speed is controlled by actuation of the rack (16) which simultaneously alters the restriction (17) to the flow, and the tension of the governor spring (18). The movement of the control rack is limited at one end by the idling stop (19) and maximum speed stop (20). The idling stop is adjusted by the adjusting screw (21) and an idling damper is adjusted by screw (22). The maximum fuel delivery (smoke limit) is set by screw (23). The construction of this governor is extremely simple and reliable and the control is very accurate.

The feed pump when fitted forms an integral part of the injection pump. An aluminum plunger (24) reciprocates in a steel sleeve (25) in the center of the roller carrier housing and this plunger is actuated by the main cam through a small roller carrier and lever (26). The other end of this lever is arranged for hand operation for priming. The inlet and delivery valves are in the housing (27).

Two types of pump are available, each of either four or six cylinders, and can replace the "A" and "B" type pumps in general use. The weight of the pumps, incorporating the governor, are 13½ lbs. for the "A" type and 17½ for the "B" type. This latter compares with the approximate weight of the 46 lbs. for the equivalent equipment it replaces.

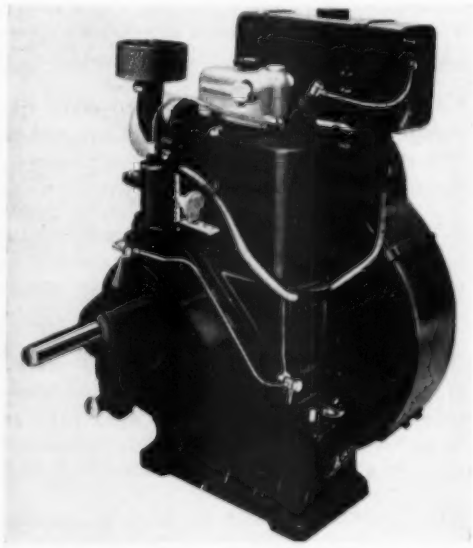
LISTER AIR-COOLED ENGINES. R. A. Lister & Co. Ltd., Dursley, Gloucestershire, has brought out a new "baby" engine. The A D is an air-cooled, 4-stroke developing 1¾ bhp. at 900 rpm. increas-

ing to the maximum of 3½ bhp. at 1800 rpm. Bore and stroke are 3 in. by 3½ in. and the bmep. at 1500 rpm. is 64 psi. with a fuel consumption of 0.55 lb. bhp. hr.

RUSTON GAS TURBINES. Ruston & Hornsby Ltd., Lincoln, England, has received an order from the London County Council for eight gas turbines of 900 bhp. each, which will meet all the power requirements at the Northern Outfall Purification Plant situated at the bank of the River Thames. Five of the turbines will drive blowers to provide a constant flow of air, and the other three will drive generators to provide the electricity requirements of the station. All the sets will operate on sewage gas which is itself a by-product.

Another order is for the Societa Nazionale Metanodotti in Italy, a national organization concerned with the exploration, drilling and distribution of methane gas which has been discovered in huge quantities. The gas turbine, operating on methane, will drive an alternator to provide light and power to the new S.N.A.M. headquarters south of Milan. It will be Italy's first industrial gas turbine.

PETTER AIR-COOLED ENGINE. Claiming to be the smallest diesel engine in the world, the PAZ-1 engine designed by Petters Ltd. of Staines, Middlesex, now in production. It is a cold-starting, air-cooled, single-cylinder, 4-stroke engine developing



1½ to 2½ bhp. at 1000 to 1500 rpm. and having a bore and stroke of 3 in. It is stated that the rate of fuel consumption is only 1 gallon in 10 hours.

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LEYLAND ORDERS. Leyland Motors Ltd., Leyland, Lancs, is supplying diesel tractors to Calcined Products (Pty.) Ltd. to assist in the development of South Africa's uranium resources. Six uranium plants are already in production in the Union and it is anticipated that an annual gross revenue of £30,000,000 will result from developments now in progress. Leyland is also supplying a number of heavy-duty dump trucks to the British Phosphate Commissioners for use in Nauru, Ocean Island and Christmas Island.

Factory Branch Manager Named

J. S. Chisholm

Appointment of J. S. Chisholm as manager of the Salt Lake City, Utah, factory branch of Electro-Motive Division of General Motors is announced by R. A. Stoddart, director of factory branches. Mr. Chisholm, who has been manager of the Electro-Motive factory branch at Los Angeles, took over his new duties recently at Salt Lake City where construction is under way on the new factory branch facility. The branch is scheduled to be in full operation by Jan. 1, 1955. Born in Pembina, N.D., Mr. Chisholm received his education in his home state, attending the University of North Dakota. He joined Electro-Motive in 1937.

W. T. Crowe Award Winners

Winners of Detroit Diesel Engine Division's W. T. Crowe Award, presented annually to top diesel engine salesmen in the division's distributor organization, were announced recently by E. F. Bentley, general sales manager. The men selected are those receiving the most points for the sale of GM Detroit Diesel engines in their respective zones, and each receives a ring.

Winners and the outlets they represent are: E. R. Paterson, Diesel Engine Corp.; J. K. Stull, McLung-Logan Equipment Co.; W. A. Branson, E. F. Craven Co.; Jack Manasco, Armstrong Equipment Co.; J. J. Janssen, Highway Equipment Co.; C. L. Teter, D. D. Kennedy, Inc.; H. S. Matthews, George Engine Co.; C. H. Cone, Borchert-Ingersoll, Inc.; T. N. Powell, Diesel Power Co.; T. M. McKean, Cate Equipment Co.; H. A. Hardin, Lawless Brothers, Inc.; and W. Brydges, Evans Engine & Equipment Co.

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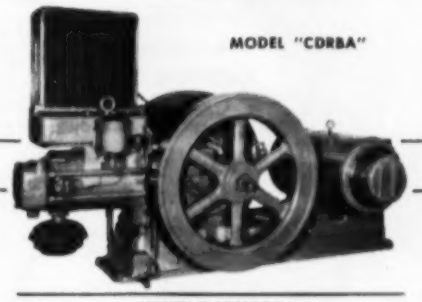

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"ADTDA"	Tank	2.4	1200	Direct
"BDRBA"	Condenser	4.9	900	Direct
"BDTBA"	Tank	5	900	V-Belt
"LDRBA"	Radiator	5.4	1350	V-Belt
"LDTBA"	Tank	5.7	1350	V-Belt
"CDRBA"	Condenser	7.7	750	V-Belt
"CDTBA"	Tank	8	750	V-Belt

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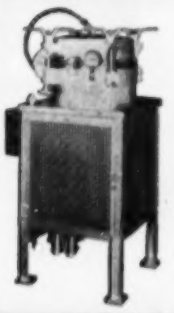

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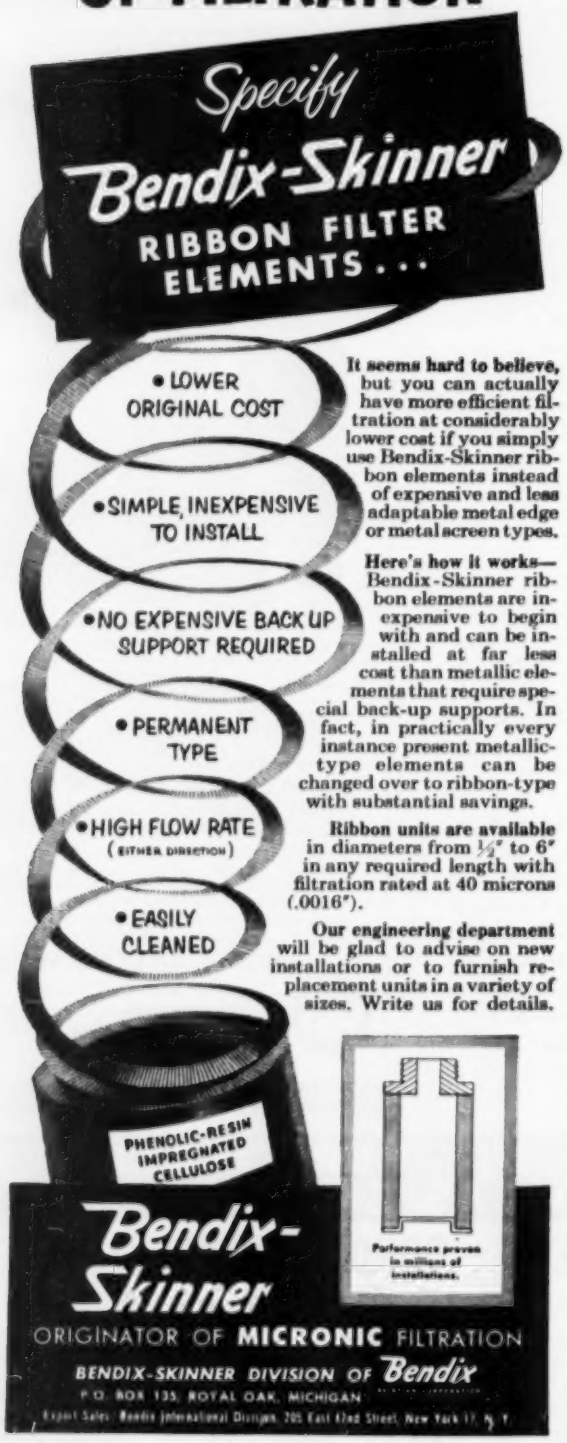
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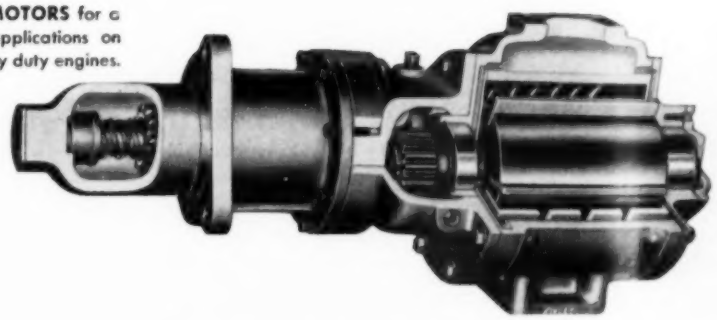

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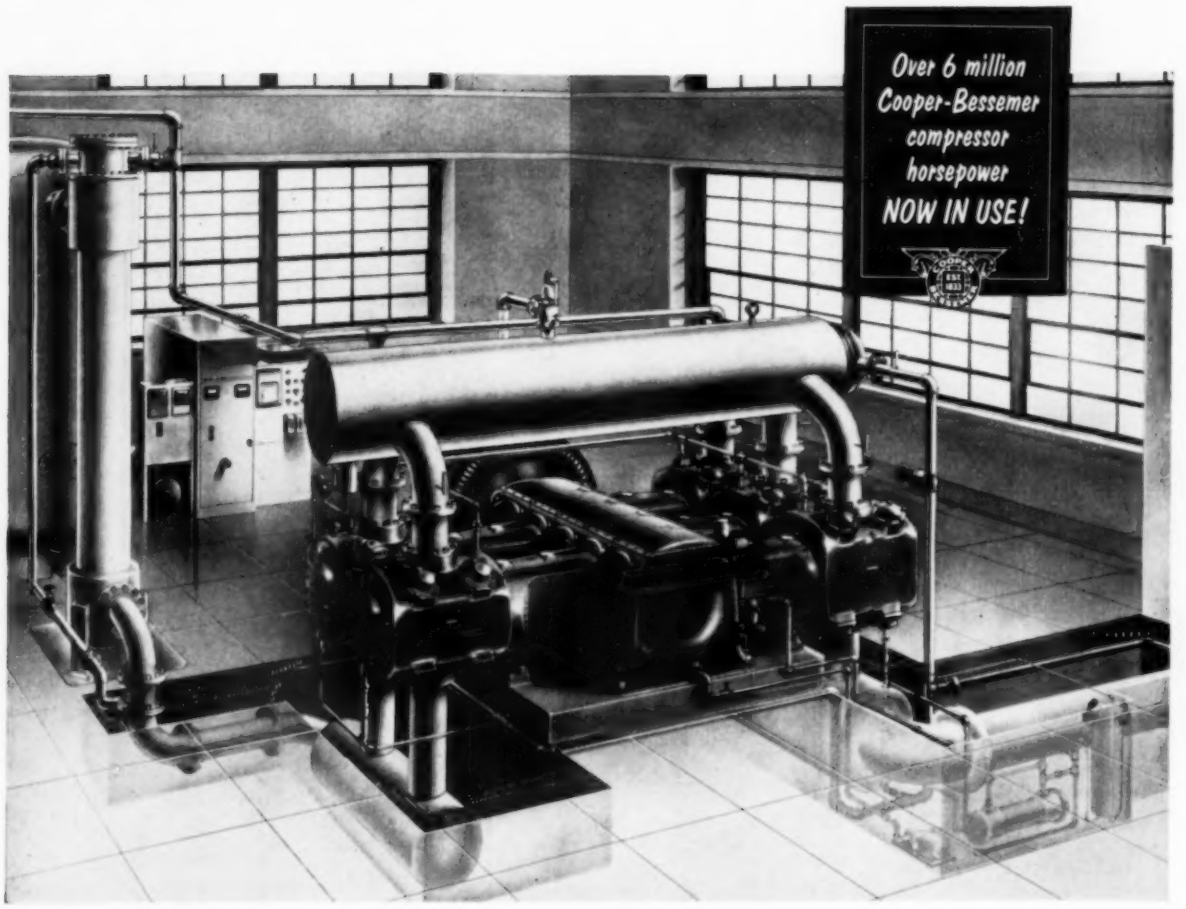

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